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NEWSPAPER

Human Rights

ACM Cuts Ties To Soviet Union

By Ann Dooley
CW Staff

NEW YORK — The Association for Computing Machinery (ACM) has severed its relations with the Soviet Union "as a result of Soviet persecution of colleagues," particularly computer chess expert Anatole Sharansky.

ACM announced its intentions in a letter to the president of the Soviet Academy of Sciences, A.P. Aleksandrov, saying it "will not cooperate with or cosponsor meetings in your country until the climate of intellectual freedom clearly improves."

The letter asked Aleksandrov to personally intervene on Sharansky's behalf.

Letter to Members

ACM also sent a letter to each of its 35,000 members requesting them to consider the situation of Sharansky and others like him when deciding whether to visit the Soviet Union or to publish in Soviet journals.

Sharansky has received worldwide notice and support since he was jailed on March 15 for alleged treason and CIA activities. He has been held without formal charges since that date; Soviet authorities have indicated his trial will begin this month.

Prominent people outside of the computer industry have also taken up Sharansky's cause. New York Senators Jacob Javits and Daniel Patrick Moynihan recently joined a committee organized by the Greater New York Conference on Soviet Jewry to obtain Sharansky's release.

Warning From Carter

President Carter and Secretary of State Cyrus Vance have also cautioned the Soviet leaders against continuing with the trial of Sharansky and others, warning that it could harm Soviet-American relations.

In addition to the ACM, other computer scientists have joined the protest against Sharansky's imprisonment. Their numbers include 300 attendees at the Fifth International Joint Conference on Artificial Intelligence, who wrote to Soviet Communist Party Chief Leonid Brezhnev asking for Sharansky's release.

But Overtures Spurned

IBM, Justice Huddle On Settlement

By E. Drake Lundell Jr.
And Catherine Arnst
CW Staff

WASHINGTON, D.C. — One of IBM's top outside attorneys here huddled recently with the No. 2 man in the Justice Department to discuss possible ways of settling the government's almost nine-year-old antitrust suit against the firm, Justice Department sources said last week.

Lloyd Cutler of Wilmer, Cutler and Pickering — a lawyer who has handled the delicate negotiations leading to out-of-court settlements in antitrust cases in the past and who now represents IBM — met with Associate Attorney General Michael Egan and John Shenefield, head of the Antitrust Division, the sources said.

Cutler reportedly made several specific proposals for ending the case, although all attempts to confirm that with any of the parties to the meeting were rebuffed last week when all three refused to answer or return more than two dozen phone calls.

However, the settlement overture apparently was rejected and lawyers directing the case told the trial team in New York last week a settlement was not in the wind despite the circulation of "rumors" about IBM political pressure for such a move.

Letter Not Discussed

The meeting was ostensibly called in order to review charges made in a letter to Shenefield from Nicholas deB. Katzenbach, IBM chief counsel, blasting the conduct of Antitrust Division attorneys in the handling of certain documents.

In particular, Katzenbach reportedly said documents allegedly linking him with the laundering of language of memos from top IBM officials [CW, Dec. 5] were an "unwarranted" attack on his integrity.

However, the subject matter of the letter was reportedly not discussed at the meeting, with Cutler instead suggesting the parties begin a "dialogue" aimed at settling the case.

In one proposal, Cutler suggested a three-person commission be established to review the case and make recommendations on how it should be settled, the sources indicated.

The inclusion of Egan in the meeting was particularly meaningful, sources.

(Continued on Page 6)

Bell-Led Task Force Urges Plan Limiting Net Choices

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — An industrywide reorganization of basic telecommunications services that could drastically alter the cost for business users' phone service has been proposed by a telephone industry task force.

Described as a "conceptual framework," the proposal was sent to the House and Senate subcommittees on communications. It contains four categories under which all telecommunications services would be provided by existing carriers and their competitors, the specialized carriers.

In general, the task force's proposal eliminates all methods by which users of private systems now reach the phone network's dial-up facilities and eliminates the foreign exchange services now available from local telephone companies for such connections, according to an AT&T spokesman.

Anticompetitive Move?

Although some industry observers called the proposal concessionary because it appears to provide ground rules under which competition could exist, others said the plan merely reaffirms the telephone industry's determination against sharing any of its business with new carriers.

The task force — made up of AT&T and smaller telephone companies across the nation — prepared the framework at the request of the House subcommittee, which is currently working on a rewrite of the Communications Act of 1934. All interested groups had been requested to submit ideas to the subcommittee, according to a spokesman for subcommittee member Rep. Tim Wirth (D-Colo.).

Under the most straightforward part of the task force's proposal, Category I, existing telephone companies would continue to provide regular local and long distance telephone service. Rates would continue to be averaged nationwide to keep down costs in rural

(Continued on Page 6)

Mini/Micro Options Grow

CW Photo by E. Surden

Attendees take in attractions of Mini/Micro.

By Esther Surden
CW Staff

ANAHEIM, Calif. — Minicomputer and microcomputer vendors introduced a raft of products at last week's Mini/Micro Computer Conference and Exposition, ranging from a desktop computer from Pertec Computer Corp. to Trident disk drive subsystems for use with minicomputers from California Computer Products, Inc.

Most of the products introduced here were peripheral equipment, showing that area to be one of great user interest.

Pertec dubbed its desktop computer offering the Attache. Weighing 25 pounds, the system is based on an 8080 microprocessor and comes in a white case with an upper and lower case Ascii keyboard.

The system uses the S-100 bus configuration and includes a 10-slot bus, a spokesman said. Standard features include LED indicators for on/off and system status, a programmable read-only memory monitor that controls operation of the system from the keyboard and a CRT output jack, the firm said.

(Continued on Page 4)

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$4,500 in Phony Deposits

Two Indicted in ATM Fraud Caper

By Catherine Arnst
CW Staff

MEMPHIS, Tenn. — Two men allegedly bilked the Union Planters National Bank (UP) here of $3,885 by making false deposits and real withdrawals at the bank's automated teller machines (ATMs).

Alexander Bucarz and Steven Richardson have been indicted for conspiring to defraud the bank after $4,500 in phony deposits were made to Bucarz's account and $3,885 was withdrawn over a weekend in June. The trial of the two men, who pleaded innocent, is scheduled for early next month.

According to Sgt. F.J. Maxey, the officer in charge of the case, Bucarz applied for a debit card from the bank to be used at one of its Docutel automatic tellers, which operate 24 hours a day. Bucarz then allegedly told Richardson his secret code and went to California, leaving directions for Richardson to get the card from his house when it arrived in the mail.

After getting the card, Richardson went to various ATMs and made two bogus deposits of $1,000 and $3,500 to Bucarz's account, according to the charges. With the UP system, deposits are made by keying in the amount and depositing an envelope with the money. However, empty envelopes were deposited to Bucarz's account.

The system automatically credits an account with a deposit, which allowed immediate withdrawals. Most of the withdrawals were made at Addressograph-Multigraph point-of-sale terminals UP has installed in supermarkets. There terminals allow customers to either credit their groceries to their account or make withdrawals at the supermarket, according to James Miller, security manager at UP. Richardson then mailed a cashier's check for $1,600 to Bucarz in California, Miller said.

The bank's security department was notified of the theft by the teller who processed the deposits. The bank had been keeping track of others in the Memphis area who had attempted similar schemes and through these persons gained Richardson's name, supposedly because he had been bragging about the crime, Maxey said.

When the bank contacted the police, Maxey discovered an outstanding warrant in the files for Richardson's arrest for passing bad checks. That warrant was served and while the suspect was being questioned, he implicated both himself and Bucarz in the UP crime, Maxey said.

Bucarz was charged with obtaining money under false pretenses and Richardson with violation of the state's recently passed debit card law; if found guilty, each can receive sentences of three to 10 years. Both have been convicted on previous felony charges.

The bank has never been the victim of this type of fraud before, Miller said. However, when the system was designed, it was anticipated that a card holder would try to get from his account money that he didn't have and the cost of the system was figured to cover those types of losses, he said.

What made this particular crime different was the conspiracy element, in which one person allegedly used another person's card. The program has now been changed to prevent such a crime from being perpetrated again, he said, although he would not describe these changes.

Miller justifed the vulnerability of the bank's system by citing the added customer convenience it provides. "I think you'll find that our terminals are some of the most used in the country" according to most studies done, he said. Had the media not exposed this case to the extent it did, the bank might never have made the changes because most people would not be aware of the vulnerability existed, he added.

The bank's ATMs are tied to an IBM 360/65 mainframe.

Firm Suspects DP Finagling In $500,000 Plastics Theft

By Tim Scannell
CW Staff

BRAINTREE, Mass. — Detectives here confiscated four truckloads of plastic merchandise and company records from Chemical Maintenance Corp. in what is believed to be a computer-assisted larceny scheme involving $500,000 worth of goods.

The alleged crime apparently involved underbilling for plastic bags sold by American Cellophane and Plastic Films Co., Inc. to Chemical Maintenance Corp., according to the complaint filed with Suffolk Superior Court.

American Cellophane officials believe that an unidentified employee allegedly collaborated with Chemical Maintenance Corp. to input false payment information into American Cellophane's DP system, Assistant District Attorney Joseph Doyle said.

Sources believe the fraud was committed through use of a flagging code that would prompt the CPU to falsely indicate certain accounts receivable as paid.

Officials of American Collophane believe the scheme went on for approximately two years. Their records were also impounded and will be included along with the evidence presented before a grand jury.

Neither side would comment on the matter, pending an investigation.

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Peripherals Dominate Debuts at Mini/Micro

(Continued from Page 1)

The basic configuration costs $1,449 assembled and tested. The firm can be reached at 21111 Erwin St., Woodland Hills, Calif. 91367.

Calcomp came to Mini/Micro with three disk subsystems, a floppy disk system and its recently announced Model 906 on-line plotter controller. The disk drive systems were designed to operate with the Digital Equipment Corp. PDP-11 family, the Data General Corp. Nova or Eclipse systems and the General Automation 16 series.

The drives incorporated in the systems handle from 25M bytes to 300M bytes of storage on each drive; a subsystem can include up to 2.4G bytes, a spokesman said.

The 2251 controller for DG minis costs $8,294; the 2350 for GA systems is priced at $8,900 and the 2551, which interfaces to DEC systems, costs $8,294.

Calcomp Floppy

The floppy disk system was designed for use with any processor having an RS-232C communications port, the firm explained. It includes two floppy disk drives, power supply, cables and a microprocessor-driven controller that supports as many as four drives and up to two RS-232C connected drives, the spokesman said.

It can use either single-sided or double-sided media. The subsystem costs $3,630 with an an RS-232C interface or S-100 bus interface and $3,830 with an LSI-11 interface. These prices include two double-sided drives, a controller and the interface. Calcomp is at 2411 W. La Palma, Anaheim, Calif. 92801.

Intel Add-In

An add-in memory card said to be software-compatible with DEC PDP-11/04 and 11/34 minis was announced by Intel Memory Systems. The card uses 8K and 16K random-access memory devices to provide 32K, 48K or 64K by 18 bits of memory capacity. The card fits into a single PDP-11 hex height card slot, the company said.

Parity checking is a standard feature of the system while a status control register allows the host system to locate and record a failing memory address, a spokesman explained. The use of a DEC parity controller module is reportedly unnecessary.

The 32K version costs $2,625. The 48K and 64K version will not be available until the second quarter of 1978, the company noted from 1302 N. Mathilda Ave., Sunnyvale, Calif. 94086.

Memorex Drive

Memorex Corp. also came to the show with a minicomputer peripheral — a dual-headed floppy disk drive. Called the 552, the unit incorporates two ceramic read/write heads that allow recording or reading of data on both sides of a dual-sided floppy disk, a spokesman explained. The 550, Memorex's single-sided drive, can be converted to the 552 by a "simple factory procedure," the firm said.

The unit offers a capacity of up to 1,600K bytes of unformatted data or 492K bytes in IBM 4964 format. Access time is 3 msec per track and the data transfer rate is 250K byte/sec in single-density mode. Addition of a controller will allow the unit to be operated in double-density mode "without modification," the company said.

The 552 floppy disk drive costs $585 in OEM quantities. Memorex is located at San Tomas at Central Expy., Santa Clara, Calif. 95052.

Two drum-type form printer mechanisms were brought to the show by Anadex, Inc. The FPM-600 and the FPM-700 are numeric and alphanumeric printer units that can print up to 19 columns on either standard medical forms or forms of varying widths, a spokesman said.

The FPM-600 costs $425 and the 700 costs $695 for the basic unit, the spokesperson noted. The company is at 9825 DeSoto Ave., Chatsworth, Calif. 91311.

A company called Innotek brought its MT-100 mini cartridge tape system that can directly interface to the S-100 bus. The MT-100 unit incorporates a Qantex M200 minidrive and costs $845. Another drive can be added for $495. Innotek is at 23059 Leonora Drive, Woodland Hills, Calif. 91367.

Centronics Printer

Centronics Data Computer Corp. came to Mini/Micro with another printer designed for use with microcomputers. Called the Microprinter-S1, it features a 7-bit Ascii serial RS-232C interface with parity and switch-selectable transmission rates from 50 bit/sec to 9,600 bit/sec, the firm said. The unit uses aluminum-coated paper.

Printing is accomplished through the discharge of an electric arc to penetrate the coating, which is less than one micron thick, a spokesman said. The printer can operate at 150 line/in. and five, 10 or 20 char./in. are software selectable. It comes with a 192-char. first-in-first-out buffer. Priced at $695, the first unit will be available in the first quarter, Centronics said from its headquarters in Hudson, N.H. 03051.

Tax Group Asks for Help

MONTVALE, N.J. — The New York State Tax Commission has asked the Association of Data Processing Service Organizations (Adapso) to form a task force to aid in drafting state sales tax regulations for software and services.

The task force will solicit examples of problems believed to be unique in these areas so that its proposals may consider as many problem situations as possible.

Those interested in providing material to the task force should promptly contact Bob Goldstein, Adapso, 210 Summit Ave., Montvale, N.J. 07645.

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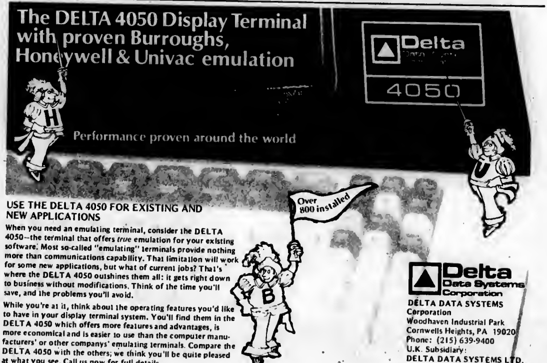

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IBM Encryption Devices Designed for Point-to-Point And Intranet Transmissions

By Brad Schultz
CW Staff

WHITE PLAINS, N.Y. — IBM has announced three encryption devices — two for protection of point-to-point data transmissions and a third for security of advanced DP installations.

The tabletop 3845 and rack-mounted 3846 encryption devices protect point-to-point transmissions — between a computer and inquiry terminal, for example — and are adaptable to a variety of hardware manufacturers, the spokesman said.

The IBM Cryptographic Subsystem, the third product announced, protects data networks, he continued, noting that it is a combination of hardware and software for IBM 370 CPUs.

Encryption entails transmitting information in secret code form and deciphering it at the receiving end, the spokesman explained, noting that by this scheme information intercepted en route would be incomprehensible to anyone not having the "key" by which the information is encoded and decoded.

An encryption key is a string of bits, he said, adding that since each bit may be either "0" or "1," the 56-bit key IBM uses may have 2^{56} — or about 72 quadrillion — distinct combinations.

IBM's encryption method has been approved as a Federal Information Processing Standard by the National Bureau of Standards [CW, Dec. 20, 1976], although its impregnability has been questioned [CW, Dec. 5, 1977].

Users can install both 3845 and 3846 devices and change keys by means of a hand-held keyboard unit, and no programming changes are needed to use the devices with most CPUs, terminals and carrier equipment, the spokesman maintained.

Typical Configurations

A typical 3845 or 3846 configuration for computer-to-terminal communication consists of a CPU-3845 or 3846-modem-transmission lines-modem-3845 or 3846-terminal combination, in that sequence, he said.

The Cryptographic Subsystem encrypts data stored on magnetic tape and disk files and is comprised of two software products and one hardware product.

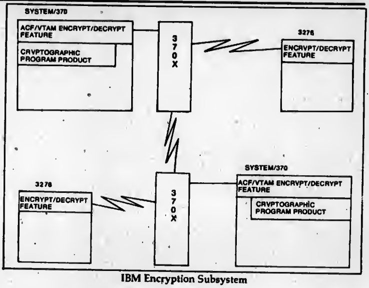
The constituent software products are the Programmed Cryptographic Facility Program and the Advanced Communications Function for Virtual Telecommunications Access Method (ACF/Vtam).

The constituent hardware product is the 3276 control unit display encrypt/-decrypt feature.

IBM is not the first vendor to offer encryption file protection for IBM products. Earlier this year, Odyssey Systems, Inc. of Cambridge, Mass., announced a software product called Fortress aimed at 360/370 users and said to employ the same NBS encryption method in protecting source, object and load modules as well as data files [CW, April 11].

The purchase price of Fortress was set well under the announced prices of IBM's encryption products. The unit price of Fortress object code with documentation was set at $975, whereas IBM announced 3845 and 3846 purchase prices ranging from $2,125 to $3,600 per unit — depending on the model selected. The hand-held keyboard unit for use with 3845 and 3846 devices costs $265.

The IBM Programmed Cryptographic Facility Program and the ACF/Vtam encrypt/decrypt feature are available for monthly license fees of $250 and $125 respectively. The terminal encryption/decryption feature costs $1,710 or $42/mo under a two-year lease.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SCDP Honors Taylor

MEMPHIS, Tenn. — The Society of Certified Data Processors (SCDP) has presented its first Founding Father Award to Alan Taylor, citing his "contribution to data processing professionalism."

Taylor, a *Computerworld* columnist, created the SCDP in 1971 with the goal of making it an organization of "legally recognized data processing professionals." Taylor is deeply involved in legal DP issues, the society noted.

As for the future of the award itself, Vice-President Jerry J. Martin said the SCDP will "call it the Taylor award. After all, there are many women members of SCDP and the 'Founding Father' name just won't do at all."

IBM, Justice Brass Huddle

(Continued from Page 1)

said, because he is the highest ranking official in the department who can deal with the case. Attorney General Griffin Bell excused himself from acting on the IBM case because his Georgia law firm represented IBM.

The title of Associate Attorney General was recreated particuarly for Egan, and he is listed as the No. 2 man in the department on organizational charts.

In addition, he is considered the "political czar" of the department, sources said, and would likely be consulted about matters that could have political implications.

Likewise, Cutler — who was described as "brilliant" — might be the "logical person" to conduct settlement negotiations from the IBM viewpoint, antitrust lawyers here indicated. His firm has extremely close ties with Cravath, Swaine & Moore, the firm representing IBM in the case in court, and is well known in Washington legal circles.

Furthermore, the sources indicated the Cravath, Swaine & Moore "settler" who specialized in settling such cases had retired recently.

Not First Powwow

The meeting was not the first between Justice Department officials and IBM attorneys about the case: last January Katzenbach himself met with Donald Baker, then head of the Antitrust Division, in what was reported to be an attempt to outline what IBM would like to see in any settlement of the case [CW, Jan. 17].

Interest may have been renewed in a settlement on the side of IBM, other legal sources indicated last week, because the testimony of Dr. Alan McAdams, the government's chief economist, was stronger than the IBM attorneys had expected.

If IBM loses the government antitrust case, it will be open to treble damage suits from users who could use the government decision as *prima facie* evidence that IBM monopolized the computer market. The users would then only have to prove their damages and would not have to prove IBM monopolization.

On the other hand, the Justice Department may be interested in a settlement, since the IBM case is tying up a great deal of the department's resources, which could be devoted to other matters if the case were ended.

AT&T Asks Curbs on U.S. In Antitrust Evidence Search

By Jeffry Beeler
CW Staff

WASHINGTON, D.C. — The Justice Department is improperly trying to obtain evidence in its antitrust suit against AT&T by seeking documents from private antitrust cases involving the firm, AT&T has charged.

The allegation appears in recent pretrial motions filed here shortly after the Supreme Court refused to hear AT&T's argument that the three-year-old antitrust suit against the Bell System should be dismissed [CW, Dec.5].

Asked last week to respond to the charge, a Justice Department official agreed that the government has sought permission to review sealed records from private antitrust suits against AT&T. But he denied that there is anything improper in that tactic.

"If we couldn't use documents from private antitrust cases, we wouldn't go after them," the spokesman explained. He insisted that the Justice Department would be "negligent" if it ignored that evidence.

Access to records of the private antitrust suits brought against the Bell System by Litton Systems, Inc., Wyly Corp. and MCI Communications Corp. would speed up preparation of both the government and AT&T cases.

"We want to avoid a situation where the two parties spend years passing relevant documents back and forth between each other" before the trial even begins, the spokesman explained.

In its pretrial motions, filed at U.S. District Court here, AT&T asked Judge Joseph C. Waddy to restrain federal attorneys from seeking evidence from private antitrust suits. Waddy has not yet responded.

To buttress its request, AT&T cited recent appellate court decisions which it claims prohibit the use of such documents.

The Justice Department, however, denies knowledge of any such appellate court rulings, the source replied. In fact, when the issue arose during the Litton case recently, a magistrate in New York City pronounced the practice "sensible and innovative," the Justice Department spokesman reported.

AT&T officials have also accused the government of trying to rush the case to court before AT&T's attorneys have had a chance to prepare an adequate defense.

Company lawyers contend they will need at least four years to ready their case for trial.

The Justice Department admits it favors an early trial date but insists that its only motive in resisting delays is to cut costs, the official said.

Revamp Plan Limits Users' Net Choices

(Continued from Page 1)

areas, the task force said.

Category II covers special communications networks that connect a cutomer's various locations. Under the plan, these special networks could be connected to the nationwide dial-up phone network only through switching equipment such as PBXs at customer locations.

A charge made for this type of connection would allow the telephone companies to recover the value of the service lost because of the traffic on the noncarrier network.

Special nets covered under Category II include those provided by the specialized and other competing carriers.

The key to this provision is that all switching equipment must be within the using company, according to the AT&T spokesman. This would apparently mean, therefore, that a salesman in the field would not be able to use the local dial-up network to access a specialized common carrier used by his company.

Category III covers private communications networks provided by existing or specialized carriers or by the user. Such networks would not be allowed to interconnect with the dial-up facilities and could only communicate with other stations on the same network.

Category IV would allow certain services such as switchboards and phones at customer locations to have direct access to the dial-up network.

Although not entirely clear, it appears that users who access networks through local calls would no longer be able to use such services unless their calls went through a switchboard at one of their own company offices.

This would virtually eliminate the type of service now provided by companies like Telenet Communications Corp., several industry sources said.

Solution to Dilemma

Asked if the new framework were meant as a substitute for the AT&T-fostered Consumer Communications Reform Act, the AT&T spokesman said the Reform Act had been mainly designed to get people to think about the issues while the latest framework is the first step toward finding solutions to the dilemma.

A spokesman for one of the specialized common carriers called the latest move by the telephone industry just another attempt to eliminate the specialized carriers.

Another regulatory expert said the plan "puts everything right back at square one. The telephone industry, after losing the interconnection and specialized carrier battles, will now try to use every legal and regulatory tactic to stall progress, and nobody in government has the guts to stand up to it."

Among the services that would be eliminated if the task force proposal were adopted are off-net Common Control Switching Arrangements (CCSA); FX lines; MCI's Execunet and switched private line service; Sprint, offered by Southern Pacific Communications Co.; and value-added services such as those provided by Telenet.

Although most noncarrier industry groups were studying the proposal last week, the Ad Hoc Committee for Competitive Telecommunication issued a statement that said the task force "seeks the same objectives as the Bell Bill under the guise of compromise."

In a letter sent to members of Congress, the group said the Bell Bill "would have eliminated competition by a single stroke. The new proposal would starve us out of existence.'

The proposal would severely curtail the services that competing carriers are now allowed to provide, an industry source said.

It would also eliminate important money-saving services from the telephone companies that business users need, he added.

The House Subcommittee on Communications will begin drafting legislation in January to update the Communications Act; the legislation is expected to be introduced into Congress about Easter.

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Justice, FTC Oppose Antitrust Review Bill

By Edith Holmes
CW Staff

WASHINGTON, D.C. — The Justice Department and the Federal Trade Commission (FTC) joined forces here last week to oppose legislation that would create a special commission to conduct a comprehensive study of competition in the U.S. economy.

Sponsored by Rep. Morris K. Udall (D-Ariz.) and 40 others, H.R. 6098 would mandate a broad review of all the factors contributing to increasing industrial concentration and the threats bigness in business poses to the free enterprise system (see story on Page 8).

"I do not believe the general study of competition or the antitrust laws contemplated by this proposed legislation is either necessary at this time or likely to result in the kind of report that would prove useful," John H. Shenefield, Justice's assistant attorney general for antitrust, told the House Monopolies and Commercial Law Subcommittee during hearings on the Competition Review Act of 1977.

The proposed study is "entirely too broad and ambitious," Shenefield contended. He is worried the three-year commission would take staff and resources from the already hard-pressed antitrust enforcement agencies.

The antitrust chief favors the approach President Carter took recently in setting up a commission that will study two topics in six months — antitrust exemptions and how to handle complex cases.

FTC Chairman Michael Pertschuk said his agency supports the purposes of the bill, but added there are "several possible disadvantages that give us concern."

A commission of the kind Udall has proposed might be used as an excuse to frustrate ongoing enforcement activities, Pertschuk noted. Several of the industries the bill would have the commission examine are already the subject of FTC investigations.

Washington Update

Senate Starts Shuffle After McClellan Death

The recent death of Sen. John L. McClellan (D-Ark.) has precipitated leadership shuffles in several key senate committees that affect computers and communications issues.

McClellan, who headed the powerful Senate Appropriations Committee, will be replaced by Sen. Warren D. Magnuson (D-Wash.), Capitol Hill sources agree. This promotion for Magnuson will mean a vacancy chairmanship in the Senate Commerce Committee, home of the Subcommittee on Communications.

The senator considered the most likely choice to head the Commerce Committee is Howard W. Cannon (D-Nev.), sources said. As head of the Senate Rules Committee, which governs the Senate's own computer operations, Cannon is familiar with computer and communications issues, and no one contacted by *Computerworld* expects the direction of the Commerce Committee or its Communications Subcommittee to change under Cannon.

The slot is expected to be filled by Sen. Claiborne Pell (D-R.I.).

Pell sat on the Rules Committee as one of its members, but sources agree he is the "unknown quantity" in the Magnuson-Cannon-Pell triad.

VA Moves on Target, Picks HIS as Supplier

With a congressional go-ahead and $18.4 million in hand for fiscal year 1978, the Veterans Administration (VA) has selected Honeywell Information Systems, Inc. to install its controversial Target computer system nationwide.

Intended to process veterans compensation, pension and education benefit claims, Target drew considerable fire from members of Congress over the summer [CW, Aug. 1].

Under Target, VA regional offices in 56 locations across the U.S. and in Puerto Rico will communicate on-line via satellite, minicomputers and CRT terminals to large-scale host computers in three regional DP centers. These regional host systems will, in turn, communicate with a central host system containing master files, according to Max Cleland, VA administrator.

A dual Model 66/80 large-scale system at HIS' manufacturing site in Phoenix will initially be used for conversion and testing. A dual Model 66/-60 will be installed next May in Hines, Ill., to serve as the host for the distributed system, an HIS spokesman said.

Dual Model 66/80 systems will be installed at VA regional DP centers in Hines, Los Angeles and Philadelphia. Each center will serve approximately 20 regional offices.

Equipment in these offices will vary depending on the size of the facility, ranging from one to four Model 6/37 minicomputers, from 10 to 137 Model 7760 CRT terminals and from seven to 32 Rosy-26 advanced model serial printers.

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To Speed Cases Like IBM, AT&T

Carter Creates Group to Eye Antitrust Process

By Edith Holmes
CW Staff

WASHINGTON, D.C. — President Carter has ordered a commission into existence to deal with the problems created by large antitrust cases such as those involving IBM and AT&T.

The commission will work from the assumption that the antitrust laws are what they should be, but that procedures need to be developed to allow these laws to work more effectively through the Justice Department's Antitrust Division, the Federal Trade Commission (FTC) and the courts, a Justice Department spokesman said.

Given a life of six months from the time the last of its 15 members is appointed by the President, the commission will examine how to make the big cases run to conclusion more smoothly and expeditiously, he said.

In addition, the commissioners will look at the exemptions and immunities now provided by the Sherman and Clayton antitrust acts.

As recommended to Carter by the Justice Department, six of the commissioners will be from Congress and five from the private sector.

The remaining four members will be Assistant Attorney General John Shenefield, FTC Chairman Michael Pertschuk, one of the chairmen from such independent regulatory agencies as the Civil Aeronautics Board or the Federal Communications Commission and a federal district court judge.

The antitrust commission will not delve into cases currently in litigation, the Justice Department spokesman stressed. At most, suits like U.S. vs. IBM and U.S. vs. AT&T will serve as case studies on the course taken by large antitrust cases.

Reflects Bell'a Concern

The Justice Department's suggestion to the President that he create such a commission is a reflection of the attention Attorney General Griffin B. Bell wants placed on the big cases, the spokesman said.

Since an interview with *Fortune* magazine in which Bell suggested that the government's case against AT&T was the kind he might send to Congress, Bell has said he never intended to take the suit against AT&T out of the courts [CW, Sept. 19].

In a recent interview in the Bureau of National Affairs' *Antitrust and Trade Regulation Report*, Bell reiterated that he will take "no existing cases to Congress." He told the bureau that it is his style to provoke discussion of an issue, that he was "merely speculating on possibilities for the future."

Bell's speculation has provoked considerable discussion on Capitol Hill and in private legal circles.

Many fail to understand how Congress can be involved in the trial of antitrust matters. "If Bell is proposing a trial in the sense that we normally think of trials, I don't see how it can happen," a staff member for the Senate Antitrust and Monopoly Subcommittee said.

"Trial by Congress" sounds unconstitutional, another Senate source stated. "The antitrust laws are clear enough, and by passing them Congress has already been involved in large cases."

Bogged down in proposed legislation calling for divestiture of the oil companies, airline and trucking reform and ways to deal with conglomerate mergers, the Senate Antitrust and Monopoly Subcommittee hasn't had time to look into the handling of large antitrust cases, he said.

Hart Bill Reincarnated

On the House side, a bill has been introduced that would establish a special commission to conduct a comprehensive review of the state of competition in the U.S. economy.

Called the Competition Review Act of 1977, H.R. 6098 would examine many of the same subjects the late Senator Philip Hart (D-Mich.) studied in his efforts to break up industrial concentrations, a Capitol Hill source said.

Neither Bell's suggestion nor the proposed competition act is "really very new," a House Judiciary Committee staff member said. "Where industries have [messed] up in the past — public utilities, banking, railroads, securities — they've been reorganized by Congress.

"Congress has done the groundwork for its role in industrial restructuring — look at all the Hart hearings, for example," the staffer added. "Right now we're rewriting the Communications Act of 1934, and look at all the bills on the hill for divesting the oil industry."

A Washington, D.C., attorney and consultant on communications law and regulatory policy, John Eger, also sees the continuation of an old debate in Bell's suggestion of congressional involvement in restructuring.

Eger, who previously served as principal advisor for telecommunications to President Ford and as acting director of the White House Office of Telecommunications Policy, said congressional participation in structural questions might have been resolved during the Nixon-Ford White House days had Hart's proposed act been a little less stringent.

Having succeeded Hart as chairman of the Senate Antitrust and Monopoly Subcommittee, Sen. Edward Kennedy (D-Mass.) believes, as the Attorney General does, that large antitrust cases need to be expedited, Eger stated.

Because of his political savvy, Kennedy might succeed where Hart failed, Eger indicated. He believes, too, that Bell's suggestions that large antitrust cases be handled in part by Congress is in accord with Hart's proposals.

Hart and those who have come after him essentially would spin off those issues dealing with restructuring to Congress while leaving the actual antitrust case intact for trial by the courts, Eger said.

Large corporations would then bear the burden of proving to the courts that one or the other of these federal agencies acted capriciously in propoaing structural reform, he suggested.

Congress would legislate a minimum standard — market share, for example — and permit the FTC and the Justice Department to propose structural reforms for particular industries.

Congress would not "try" the corporation. The legislature would set up a red flag that would fly when a par-

(Continued on Page 10)

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French Bill Seeks Data Protection Commission

Special to Computerworld

PARIS — When the French government sent its privacy bill to the parliament here last summer, like most European governments it proposed a set of rules and regulations that would be enforced by a 12-member national commission on data processing and freedom.

However, the government-proposed bill has already been modified considerably by both the senate and the national assembly (see related story on Page 11) and what the law will look like by year's end is anybody's guess.

The bill called for the commission's responsibilities to include "informing all persons concerned of their rights and obligations; by consulting with them and supervising the application of computer techniques to the processing of personal data."

The act would apply to both public and private organizations using DP techniques. Personal data was defined to include any information "which permits the identification, directly or otherwise of the public or private legal persons to which it relates."

One of the salient features of this bill instructed administrators and judicial officers that: "No judicial or administrative decision implying a judgment on human behavior shall be based solely on data processed by automated devices" [Article 2].

Public authorities would need permission to process personal information and private entities would be required to submit a "declaration" to the commission "containing an assurance that the processing satisfied the requirements of the act." Under the terms of the bill, a fee to cover the cost of the commission's services could be levied on organizations making declarations.

Contents of Declarations

Declarations would have to contain a number of specific details, such as the name of the person responsible for the system, the purpose and characteristics of the data processed and the office where persons may access their files. In addition, it would have to list the categories of persons who have direct access to the recorded data, what interconnection or secondary uses are performed with the data and security measures taken to protect the integrity and confidentiality of the data.

The commission would be empowered to conduct on-the-spot inspections, compel the production of necessary documents, decide the degree of "risk of encroachment to private life or freedom" present in any system, impose special security requirements and receive claims, petitions and complaints.

Processing of personal data carried out in France for transmission abroad would be subject to the same declarations as data processed for domestic use. However, data processed outside France "may be made subject to prior authorization or to rules defined by the Council of State, to ensure the provisions of the act are respected," the bill specified.

The legislation set forth rules on collection and storage of data, procedures for access to personal files and penalties for violations:

- Persons from whom personal data is obtained shall be informed of the compulsory or optional nature of replies, of the consequences for failure to reply and of the identity of the individuals or corporate bodies which receive the data.
- Except where expressly provided, personal data shall be stored for only as long as necessary in view of the purpose for which it was collected.
- Persons must consent to the recording of data which reveals racial origins, political, philosophical or religious opinions or affiliation in trade unions. An exception is made for churches, political parties and trade unions to collect such data on their members but within limits of "the public interest."
- Persons may have access to all data concerning them by applying to the organization maintaining it. A copy must be made available for a fee, and any information which is inaccurate, incomplete or misleading must be corrected, completed, clarified or obliterated. Data in the hands of the police or security agencies is exempted.
- Imprisonment for up to five years and fines ranging from $5,000 to $200,000 may be applied to anyone convicted of violating collection, maintenance and disclosure provisions.

Once adopted, the law would become effective within three years. The public sector would be regulated first, with all authorities having personal records filing "simple declarations" of thair existence.

Once the commission is operational, steps would be taken by the council of state to activate regulations for private organizations.

First German Privacy Trial Involves Mail-Order Data

Special to CW

BAD KREUZNACH, Germany — The prosecutor here has presented charges in the local court against four persons who allegedly violated the state of Rhineland-Pfaltz data protection law. This is the first litigation over a privacy statute in Germany, according to the *Frankfurter Algemene Zeitung*.

The case involves a 31-year-old student who allegedly obtained and used in an unauthorized manner information protected by the privacy law. Another defendant and his associates who operate a mail-order gift catalog firm are said to have persuaded and paid the student to turn over documents containing the names and addresses of 11,355 citizens residing in this area.

The student allegedly secured a list of names collected for use in an academic research project from a government office. But he apparently sold them for 1,500DM ($600) to the mail-order firm. Earlier, the same student is alleged to have passed another sizeable list to the company, this time for 8,000DM($3,500).

The defendants live in the state of Baden-Wurtenberg, which has no data protection law. However, they used data from this community and were apprehended here, so charges can be pressed against them. Once the Federal Data Protection Act becomes effective on Jan. 1, either national or state laws can be used to prosecute those who abuse personal records in Germany.

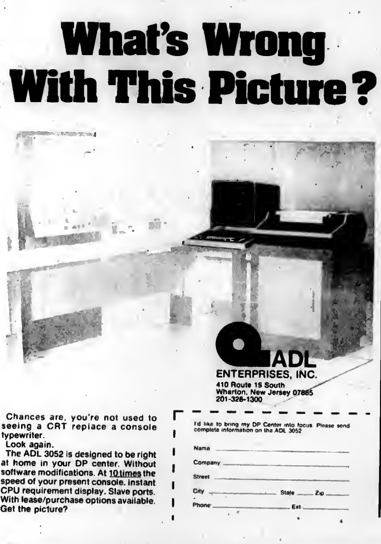
Group to Eye Antitrust Process

(Continued from Page 8)

ticular industry became too concentrated in the hands of one or a few corporations. The House and Senate would also empower the Justice Department and the FTC to do something about that concentration of power, Eger explained.

In the end, the courts would still judge whether companies within an industry should be divested.

Rather than let the Justice Department and the FTC propose structural reforms, Hart would have created an agency — the Industrial Reorganization Commission — which would have had few restraints to its power. From the Ford Administration's viewpoint, this was a major drawback of the bill, Eger stated.



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French Parliament Ending Privacy Law Debate

Special to CW

PARIS — The French parliament is nearing completion of a major data processing and privacy law that will have important domestic ramifications and also may affect legislation pending in other European countries.

On Nov. 18, the senate voted to accept most of the provisions of the Data Processing and Freedom Act voted by the national assembly on Oct. 5. Both chambers must now iron out differences before final enactment, expected by the end of the year.

The senate notably strengthened the national commission established under the law. This was done by broadening its membership from 12 to 16 to include four parlimentarians and a journalist and through giving it an independent administrative authority.

The senate also recognized the international implications of protection of personal data. The official senate report invited the government to collaborate on an international convention prompted by "its concern for the protection of the individual and the need to grasp data processing realities."

In the national assembly, a controversy erupted between the parties of the government and the opposition, a left-wing coalition of Socialists and Communists. The Socialist spokesman began the debate by calling the government bill an "improvement which we will probably support." However, when the debate ended there were 289 votes in favor to 176 against, mostly Socialists and Communists.

The 153 amendments tabled before the bill commenced debate were a sign of a brewing conflict. The Socialists and Communists proposed major revisions:

- Extending the coverage to all manual files.

Abolishing any distinction between private and public data banks.

- Giving citizens "participation" in the creation of data banks.
- Requiring the election of members of the commission and creating regional bodies.
- Abolishing the exemption of the press to a collect and maintain personal data.

On the issue of the manual systems, a compromise was reached to the effect that when a public manual file presents a danger to liberty, the government, on the advice of the commission, can subject it to the provisions that apply to automated files.

The minister of justice estimated that the legislation would affect 125,000 automated systems and he speculated that extending the measure to manual files would raise the number to tens of millions which, he said, "is unreasonable."

The other amendments proposed by the left-wing coalition were defeated, resulting in its opposition to the bill.

National Assembly Amendments

Observers were surprised that the assembly dropped the word "freedom" from the proposed name of the commission, implying that a much greater interest exists in controlling data processing activities. Anxiety was enhanced by an amendment that widened the definition of personal data processing to "every operation relative to the constitution, elaboration, storage, modification, communication or destruction of personal information" [Article 11].

However, the assembly did vote for a provision to allow private-sector data banks to be registered by means of a "simple declaration" for routine systems. A new provision was included to prevent the collection of information which is fraudulently or illegally obtained.

While the assembly voted down a proposal to publicize the decision-making process of the commission, a provision requiring the commission to provide details about its procedures in an annual report was retained.

Extra Task

An additional task for the commission will be to act as a warning panel to the council of state on matters regarding transborder data. Keepers of data banks, public and private, will be required to help the commission in carrying out its duties.

Another responsibility placed on personal recordkeepers is to correct records on their own initiative as soon as they learn that files are incorrect or incomplete in any way. When information has been transferred to a third party, their correction or deletion, according to an amendment, must be transmitted to such secondary recipients.

The commission can issue exemptions from this duty.

Action Tomorrow

The French national assembly is scheduled to take up the senate-passed DP and liberty legislation on Dec. 13. The major issue for the government is whether to oppose or let pass the enlarged membership of the national commission and its independent status, which were major modifications made by the senate.

If the assembly fails to adopt the senate-passed text, a special committee of the assembly and senate would be appointed to negotiate the differences — a procedure that is similar to U.S. congressional procedure.

The significance of an assembly fight and delay in passage of the legislation would probably be no law at all until after the March parliamentary elections.

This would cast privacy into the election campaign with the left-wing parties claiming government failure in this field and socialist-communist endorsement of an even stronger measure when the new parliament convenes in 1978.

French Press Reacts

PARIS — Responses by the press to passage of a data protection act in both houses of the French parliament was mixed.

An analysis by *Le Monde* columnist Phillipe Boucher called the legislation passed by the assembly "late and already outdated."

In his assessment, Boucher complained of the naivete of the assembly in not including manual files. He noted that certain companies have seen this loophole and are moving their sensitive data into manual routines.

Even though the law is "not reassuring in its details," he said he believes it makes the computer industry uneasy because the French law, unlike proposals in a number of countries, extends the right of access to legal persons, among them commercial entities.

There is said to be a concern that this may have the effect of scaring some companies from France, he concluded.

The senate revisions should receive more favorable press and business reaction. *Le Figaro*, a leading Paris newspaper, observed, "The senators wished to ensure better protection and less constraints for users of data."

Transborder Data Meet Set

BRUSSELS — The increase in transnational data traffic has set several governments to work on preliminary regulatory plans, and as a result, barriers to computerized data moving across national frontiers are being erected under the names of privacy, data security, sovereignty or the protection of domestic data processing.

On Feb. 7-9, On-Line Conferences of Uxbridge, England, will present an international conference on the subject. Speakers will be drawn from the Public Telephone and Telegraphs, the international organizations, private carriers, teleprocessors, data processors, manufacturers, suppliers and users from Europe and North America.

Jan Freese, director-general of the Swedish data inspection board, will chair the conference.

Speakers will include A.A. Benjamin, director-general, Computing Services Association, London; F.A. Bernasconi, director-general, IBI, Rome; Prof. J. Bing, Norwegian Research Center for Computers and Law, Oslo University; and John Eger, communications attorney and former acting director of the White House Office of Telecommunications Policy.

For further information, contact Al Dunn, On-Line Conferences, Cleveland Road, Uxbridge, Middlesex, England UB8 2DD; Telephone: Uxbridge 39262.

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DOD Joins Critics of Proposed I/O Standard

By Molly Upton
CW Staff

WASHINGTON, D.C. — Add another voice to the din of dissent being heard by the National Bureau of Standards (NBS) over the proposed changes in the implementation section of the drafted I/O channel level interface standard.

In a recent memorandum, the Department of Defense (DOD) called the original December 1976 proposal "a very significant, important and reasonable step forward into the virgin territory of interface standards."

"Step Backward"

The August compromise revision, is however, "a very big step backward. The attempt to satisfy everybody may well result in satisfying nobody," according to John M. Carabello, director for data automation, management systems, in the Office of the Assistant Secretary of Defense.

In his memo to Harry S. White Jr., associate director of DP standards at NBS' Institute for Computer Sciences and Technology, Carabello acknowledged one of the issues frequently raised in discussions of I/O interface standards is that they would restrict competitive procurement because some systems manufacturers with different interface schemes would be excluded.

But Carabello called this argument "rhetoric" and pointed out there is specific technical evidence to the contrary.

Component Approach

"Are we talking about competition between bundled systems or competition between system components procured for assembly into a system? The latter orientation is where the greatest opportunity lies for stimulation of technology and competitive dollar savings," he said.

Further, he said, "the August revision has put in unreasonable technical specifications, e.g., one to four standard interfaces that may not be used, and has introduced ambiguity to such an extent that compliance can be easily circumvented and enforcement made impractical.

"The current proposal can do little more than pay lip service to the requirement for I/O interface standards," Carabello stated.

Sterile Proposal

DOD is reluctant not to oppose the revision because to do so would add time to the standardization process, but "in this case we are left no choice since the current proposal will be sterile."

DOD "strongly recommends returning to the December proposal and its prompt issuance as a mandatory standard. Only then will true technical specifics be identified and addressed for improvements," Carabello stated.

The DOD joined Norman Ream, formerly with NBS (see Page 69), Rep. Jack Brooks and the Computer & Communications Industry Association in objecting to the revised implementation section of the proposed federal standard.

Other respondents to NBS proposal have included Honeywell, Control Data Corp., Burroughs, IBM and the Computer and Business Equipment Manufacturers Association.

Simulation Group Increases Grant To $6,000

TAMPA, Fla. — The grant to develop tools, techniques and applications of computer simulation scheduled to be awarded at the Eleventh Annual Simulation Symposium will be $6,000 rather than the $4,000 originally announced.

This increase was made possible through a contribution by Interdata, a unit of Perkins-Elmer Data Systems, a spokesman said.

More information on the symposium, slated for March 15-17 here, is available from Victor P. Boyd, U.S. Postal Service, 2009 Powhatan St., Falls Church, Va. 22043.

Correction

In "IEEE Picks Getting" [CW, Nov. 21], vote counts were incorrectly reported. Ivan A. Getting received 28,161 votes and Irwin Feerst received 21,753.

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For Patient, Professional Benefits

OTA Urges U.S. Stand on Medical Information

By Edith Holmes
CW Staff

WASHINGTON, D.C. — The Office of Technology Assessment (OTA) recently urged Congress to develop a federal policy toward medical information systems before their numbers increase to the point where standardization, to maximize patient care benefits and minimize risks to individual privacy, can no longer be achieved.

The report, "Policy Implications of Medical Information Systems," suggested to Congress that automated patient treatment records could provide substantial assistance to the health professions in the face of rising demands for complete and accurate data.

Not only might such systems affect the quality, cost and efficiency of medical care by improving coordination and communication in hospitals; they could also help physicians by providing access to detailed treatment information and the latest medical knowledge, OTA said.

At the same time, one of the implications of medical information systems that must be faced is how confidential patient records can remain within them, the congressional office warned.

"Today, computer records are more secure than manual records. However, medical information systems are not widespread, and problems potentially could arise," the OTA report stated.

Recommended Actions

The office proposed that federal policy actions in a number of areas might take place simultaneously. To help ensure that the benefits of medical information systems are retained while individual privacy is protected, the report suggested that the federal government:

- Establish a central clearing house to coordinate developmental projects and provide information to the public about medical information systems.
- Provide funding for evaluation of medical information systems in a number of different medical care facilities to determine their effectiveness in terms of relative benefits and costs.
- Ensure the availability of medical information systems with specified capabilities by contracting for their design and development.
- Provide incentives for medical care facilities to adopt medical information systems that improve the quality of patient care and support research and planning.
- Authorize a central organization to develop, validate and maintain the content of medical knowledge within medical data systems.
- Develop standardized medical data bases, including nomenclature, terms, definitions, classifications and codes for use in medical information systems.
- Establish guidelines for precise standards to protect confidentiality of patient data within an institution and release of identified data to third parties.

Until now, the open marketplace has determined the kind and quality of medical information systems available, OTA said. Only the National Center for Health Service Research within the Department of Health, Education and Welfare has supported research on these systems through grants and contracts to independent investigators.

Without further federal involvement, OTA fears that research to heighten computer capabilities for improving and monitoring the quality and planning of medical care will go undeveloped, causing the loss of potential benefits to patients and the medical care system.

Focusing on three existing medical information systems, the 73-page report identified benefits and limitations accompanying these applications of computer technology. The three systems studied were Technicon's Medical Information System (TMIS) in the acute care El Camino Hospital in Mountain View, Calif.; the Computer-Stored Ambulatory Record (Costar) system at the Harvard Community Health Plan, an ambulatory care facility in Boston; and the Problem-Oriented Medical Information System (Promis) at the University of Vermont Medical Center.

Few medical units have these systems because they are so expensive, OTA reported. "Medical information systems cost about double the current average expenditure for the financial and management computer applications they replace," the study said.

"Operating costs for a hospital-based medical information system range from $4 to $9 per patient-day or from 4% to 7% of the total hospital operating budget," OTA stated.

While medical information systems are an expensive technology, many of the organizations using them reported considerable cost savings to OTA, "particularly in labor expenses." These institutions attributed savings in other areas such as the elimination of printed forms and reductions in "lost charges," in addition to reductions in clerical, admissions and nursing staff, the report said.

Copies of the report, No. 052-003-0046-8, are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 at $2.50.

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Datacomm 78 to Air World Data Flow Issues

By Tim Scannell
CW Staff

WASHINGTON, D.C. — The future licensing of computer data bases and other problems resulting from restrictive laws governing the flow of data among nations will be among the topics discussed at Datacomm 78, a conference to be held at the Sheraton Park Hotel here on Feb. 21-23.

"Crucial Junctions in World Communications" will cover information technology and its impact on world politics and present proposals currently before Congress for the restructuring of international communications policies, a spokesman for Datacomm said. The role that the data communications industry can play in affecting these proposals will also be discussed, he added.

Speakers will concentrate on laws passed by individual nations that deal with privacy, security and the licensing of data bases and will focus on the problems that multinational corporations face in building international data communications networks.

Speakers include John Eger, former director of the White House Office of Telecommunications Policy; Oswald Ganley, Deputy Assistant Secretary of State; Walter Hinchman, chief of the Federal Communications Commission's (FCC) Common Carrier Bureau; Hugh P. Donaghue, vice-president of Control Data Corp.; and William J. Durka, manager of international legislative and trade policy for General Electric Co.

Other topics will include data communications network architecture, network security and software and product trends in areas such as modems, multiplexers, data entry and distributed processing terminal hardware, the spokesman said.

Registration fees for the conference are $50 per day or $115 for the entire three-day meeting. Details on program topics and registration materials are available from the Datacomm program director at the Conference Co., 60 Austin St., Newton, Mass. 02160.

Michelson Award Unbestowed This Year

By Don Leavitt
CW Staff

WASHINGTON, D.C. — There was no presentation of the A.A. Michelson Award at this year's annual meeting of the Computer Measurement Group (CMG) here, but not because there weren't individuals who deserved it.

No award was made because none of them was nominated, according to outgoing group president Donald R. Deese.

The award was established in 1974 to recognize significant contributions to the field of computer performance evaluation (CPE). Although CMG sponsors the award, it has always depended on input to the selection process from other groups and individuals, Deese explained.

That dependence has been deliberate in order to ensure the award doesn't become "an 'in-group' thing," But people outside the selection committee apparently didn't recognize the importance of their part this year and very few nominations were received.

None of the nominees had the stature of the previous Michelson Award winners — Kenneth Kolence, Thomas Bell and Philip Kiviat — so the screening committee decided to omit the award this year.

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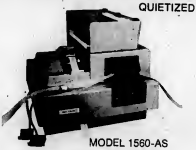

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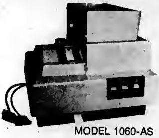

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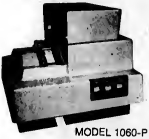

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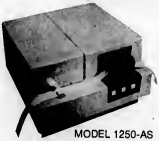

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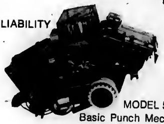

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Travel Service Offered for NCC

MONTVALE, N.J. — Sponsors of the 1978 National Computer Conference scheduled for June 5-8 in Anaheim, Calif., have announced a travel service to assist people going to the event from outside the state.

The travel service will offer a discount on air transportation, personal attention upon arrival at Los Angeles International Airport, assistance at the conference site and help in coordinating air and ground travel arrangements, a spokesman said.

NCC '78 will feature an exhibit program with more than 300 organizations occupying more than 1,100 booths, approximately 100 lecture sessions, a Personal Computing Festival, tutorial seminars and a variety of special activities, a spokesman for the American Federation of Information Processing Societies (Afips) said.

Information and registration materials are available from Afips headquarters, 210 Summit Ave., Montvale, N.J. 07645.

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A LOOK INSIDE NCIC

IN DEPTH
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IN DEPTH

By Daniel R. Kashey

IN DEPTH

National Crime Information Center Statistics

Item/Action	December 1967	December 1968	December 1969	December 1970	December 1971	June 1972	June 1973	June 1974	December 1975	June 1976	July 1977
Control Terminals	18		85		102	**97**	**90**	**86**			
Computer Interfaces	2		17		48	50	56	58			
Agencies On-Line			1,500+		4,000+	8,000+	8,000+				
Active Records	346,124	743,950	1,447,148	2,453,662	3,330,220	3,767,107	4,431,052	4,629,150	8,494,655	**8,172,217**	8,684,577
Wanted Persons	18,876	30,062	80,913	77,118	114,497	**114,306**	134,899	147,244	157,288	**148,067**	**132,890**
Stolen Vehicles	130,304	246,640	393,156	584,894	755,879	790,209	824,418	869,600	**805,431**	854,389	908,493
License Plates	31,116	81,600	146,818	206,352	252,735	**238,067**	278,399	**273,585**	**268,162**	325,379	**324,957**
Stolen Firearms	121,245	191,371	254,085	343,220	441,591	498,062	611,912	734,552	970,801	1,021,870	1,197,953
Stolen Articles	44,781	141,107	319,763	613,373	715,444	**707,732**	795,213	918,565	**846,609**	1,164,218	1,178,683
Stolen Securities		82,950	281,554	724,326	1,045,829	1,250,633	1,414,700	**1,264,991**	1,682,445	1,777,881	1,856,390
Stolen Boats			858	2,379	4,445	8,788	7,372	9,879	11,961	12,931	14,335
New Entries		923,000	1,351,095	1,632,749	1,887,584						
Record Removals		400,036	541,348	580,418	664,148						
Queries (Inquiries)		3,274,888	7,844,870	11,815,881	14,364,308						
Other Transactions		2,427,373	3,849,267	5,901,217	8,187,063						
Total Transactions		7,025,047	13,586,380	19,630,233	25,103,083				67,853,340*	74,066,604*	96,819,932*
Transactions (Daily Average)		19,194	37,223	53,781	68,778	96,000+	108,000+	148,000	181,595	227,373	259,731
Yearly 'Hits'							17,000+				
'Hits' (Daily Average)		275			700	750	900				
CCH Records							317,364	400,000	748,953	859,090	1,053,896
Missing Persons									4,985	10,602	16,980

* Monthly figure multiplied by 12.

Figures in bold denote a decrease from the previous period.

The National Crime Information Center (NCIC) is a compterized data storage and retrieval system currently serving law enforcement agencies in the continental U.S., Alaska, Hawaii, Canada and the Commonwealth of Puerto Rico.

Located in Washington, D.C., NCIC is operated by the Federal Bureau of Investigation. The FBI maintains the system and the systems files while the user agencies maintain the remote access "control terminals" and interfaced computer systems.

In addition, the FBI also has the responsibility of maintaining the data circuits connecting the remote entry locations to the central computer.

When NCIC began its operation in January 1967, it functioned on a two-hour workday. At its inception, 15 law enforcement agencies and one FBI field office were all that had access to the data system during this period of testing and experimentation.

The five original files — wanted persons and stolen automobiles, license plates, articles and weapons — formed a data base of 23,000 initial entries.

Law enforcement and its related computer technological functions of 1967 were somewhat antiquated when compared with today's methods and systems. The initial computer was an IBM 360/40 with 128K bytes of core memory that used Model 2311 disk drives for additional storage (wanted records are stored here) and Model 2702 transmission control units for communications management.

One year later, when the vehicle file was expanded and a stolen securities file added, the Model 40 was replaced with a larger 360/50 with 512K bytes of core. The 2311 disk units were replaced by bigger 2314s and more advanced 2703s took over the transmission control functions.

Initial communications were handled by over 5,000 miles of 150 bit/sec line. Today, 2,400 bit/sec lines connect NCIC to nine regionally located multiplexers. From these regional switch centers, some 150 bit/sec lines are still connected to a few original terminals, while all interfaces (direct computer-to-computer connections) and most terminals are now equipped with the faster 2,400 bit/sec lines.

The central computer performs several operations. It controls the transmission of messages both to and from itself, selects memory locations and stores records and processes inquiries and tests to ascertain whether similar information is already in storage if the test is positive, a "hit" results.

Each file contains information of a similar nature (persons, guns, etc). Each item stored, known as a record, is indexed by a number or group of numbers.

Unfortunately, each record does not have a unique identifying number. In the file of wanted persons, a name may be located under a Social Security

(Continued on Page 16)

> *The Federal Bureau of Investigation's National Crime Information Center (NCIC) is the largest automated criminal justice data base in the U.S. Users see it as an investigative tool with many different methods of access and numerous uses.*
>
> *Others, such as the computer operations people who enter queries, change tapes, sort files and schedule maintenance, carry out their tasks without ever seeing the end results, be they productive or fruitless.*
>
> *The police officer on the beat and the nontechnical person working in police information systems should know what the other is doing, how he is doing it and why. It is for these people that this article was written.*

(Continued from Page 15)

Number, a date of birth, a driver's license number or any other number which accompanied the name when it was entered or revised after entry. It is not the type of number, but the number itself which indirectly leads the program to a storage location.

A great deal of duplication exists in the areas of persons, guns, articles, boats and securities. One number may identify several different persons or articles. A simple example is several wanted persons entered with only dates of birth that are identical. A driver's license number of an individual in one state may be *numerically* identical to the Social Security Number or military service number of a person in another.

The situation is really compounded if similar names are entered with *numerically* identical identifiers. Because the machine cannot distinguish between the two, good old-fashioned leg work once again becomes extremely important.

A descriptive example is the serial number C24680246A. It may appear on several denominations of U.S. currency and on several series within the denominations. Another is the number 32961, which could be the serial number of a Colt Cobra .38 caliber revolver as well as that of a Winchester Model 73 rifle.

In actuality, an officer may request information from NCIC on a weapon with a serial number. The reply (if it is not negative) when displayed on the terminal operator's screen contains all data on all weapons stored in the computer under that number. The investigating officer must then proceed to eliminate those which are not the same make and model as the questioned item.

Serious problems arise when weapon manufacturers make several models without distinguishing model numbers and serial numbers are duplicated. Should these be entered into NCIC, the record appears to show two or more identical weapons stolen or missing, possibly at different times and from different locations.

A reply of several weapons entered from various parts of the country, all with the same brand name and serial number, can be both very frustrating and time-consuming.

More Precision

Greater precision exists in the vehicle and license plate files. American automobile serial numbers, referred to as vehicle identification numbers (VIN), are now practically unique, but ambiguity could occur with older vehicles and imported autos.

License plate numbers can be unique if a state and year of registration are included in entries and requests. In most cases, a license plate number will not be accepted for entry without this additional information.

In addition to stolen and wanted items, many missing, found and recovered articles, after being processed and not found on file, are stored. This is valuable when, for example, an automobile is recovered in one jurisdiction and checked through NCIC before the owner reports the loss in a different jurisdiction.

A license plate found in one state may be entered because it may later be of interest to an agency in another. For example, at a later date it might be identified as having been involved in an earlier crime. The same is true about lost or stolen personal identification which could later be used to falsify identity for criminal purposes.

Helpful Information

To facilitate these operations, each entry and request contains, in addition to the article and identifying number(s), an originating agency identifier (ORI). The ORI is a unique number which identifies the transmitting police agency.

Also included is an originating case number (OCA), which is a number used by that agency in its filing system to identify the case or investigation which involves the questioned item or person. Should an agency receive a hit on an inquiry, the reply contains the ORI and OCA of the police agency that originally entered the record.

Additionally, the originating agency is notified by NCIC that someone (the ORI of the inquiring agency) had inquired about one of its entered records. The two agencies must then follow up by telephone, teletypewriter or in person.

Why are all of these identifying numbers necessary? Imagine receiving a reply that the automobile you have inquired about is stolen, but not being told by whom it was reported. Further, if you are told it has been stolen in and reported by a large police agency such as New York City, imagine how you

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would go about locating the correct officer and case.

When a wanted person is taken into custody or stolen or missing property is recovered, only the originating agency can remove the record and it is its responsibility.

While record removal is done by the entering agencies, record purging is completed by NCIC with differing criteria for each file. Wanted persons are retained indefinitely, as are stolen and missing weapons.

Motor vehicles and boats are retained for four years following the year of entry (YOE). YOE is also included in each record and allows automatic purging as are serialized articles, with the exception of money orders and travelers checks, which are only retained for two years.

License plates are kept in the file for one year after the year of entry. Vehicles entered with a license plate but without a VIN are purged after 90 days.

There is nothing to preclude an agency from reentering a record after its expiration. For example, a license plate number may be the only available evidence in the investigation of a serious offense.

It would be foolish to allow the NCIC record to be destroyed after one year. A few days following the purging, an officer might initiate a query on that plate, possibly out of suspicion or routine, and the response would be "No Record.".

One practice that exists is the reentering of records when notification of deletion arrives, providing enough interest still exists in the investigation. To avoid surreptitious manipulation or elimination of records, originating agencies are notified of any request for, elimination or purging of entries.

Quick Record Growth

From the original 15 control terminals, NCIC grew until in 1971 there were 102 on-line control terminals and service had expanded to all FBI offices. The accompanying chart depicts the growth of access locations and the elimination of redundant or noncost-effective control terminals as well as file additions, expansions and hits.

From the data contained in the chart, it can readily be seen that the number of records in most files grew most rapidly during the first three years of a file's existence. Afterward, the percentage of growth increase over the previous year gradually decreased in most cases.

It is still too soon to have reached a level growth rate, and as long as new users continue to come on-line and the increasing ease of access promotes a higher volume of entries, inquiries and hits, reasonable assumptions about growth rates can not be made.

The number of records in a file fluctuate dramatically because of unusual occurrences. For instance, the enormous growth in the stolen securities file during 1970 and 1971 was a result of the entering of tens of thousands of serial numbers of U.S. currency paid in ransom to airline hijackers and other extortionists.

At some point in the future, large blocks of these records will be simultaneously purged, causing a drastic drop.

Prior to NCIC, there were no central repositories from which an officer could gain information on items he might have been investigating. The process usually involved many long distance telephone calls, teletypewriter messages, hunches — and, many times, luck.

With the inception of the system, a long distance telephone call to one of the few control terminals narrowed the procedure, but the time element was a continuing factor when the information need was immediate.

Responses during this period could take two to 30 minutes. As peripheral terminals were attached to the control terminals and other computer systems were installed in other geographic areas, local telephone and radio requests became more common.

Many systems are in operation today in which keyboard terminals, located in police vehicles, permit immediate inquiry and timely response. It is the elimination of the human-to-human transfer of information that has drastically reduced the span of time involved from request to receipt.

I believe there is a direct relationship between the degree of suspicion an officer has concerning an item and the amount of time he is willing to wait for a response on that item. Should no degree of seriousness exist, such as when an unfamiliar vehicle appears in a particular location, he is less likely to initiate a request if he knows the response may take 15 minutes than if he can expect an answer in 20 seconds.

Just as the record growth rate rose and declined, so did the number of control terminals. In 1971 many states had more than one, each serving certain geographic areas via telephone and radio communication.

As control terminal after control terminal was interfaced with local — state, county or city — computer systems and provided access to numerous agencies through remote keyboard terminals, the need for many other control terminals was eliminated. Most of these which were eliminated were operated by counties or large cities that were later interfaced with their respective state's computer system

Joint Venture

This enormous criminal justice data system is more than an FBI-run computer. NCIC is a joint venture comprised of the current 86 control terminal operators.

Committees drawn from the user population plan, construct, operate, evaluate and safeguard the system. Among them are the NCIC Advisory Policy Board, the NCIC Working Committee, the Technical Committee and the Security and Confidentiality Committee.

The Advisory Board, according to the FBI, "recommends to the FBI general policy in connection with philosophy, concept and operational principles, particularly in the relationship of local and state system with NCIC." The members of the board are elected by their peers — other control terminal users.

The Working Committee has the responsibility for planning, designing and updating the amount and types of data to be included in records. In general it oversees the formulation, maintenance and alteration of the data base.

The Technical Committee applies computer technology and automation and to former methods of law enforcement filekeeping and communications. The Security and Confidentiality Committee has been charged with "adopt[ing} procedures to protect the

(Continued on Page 18)

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(Continued from Page 17)

confidentiality of criminal history data in the NCIC system."

NCIC's basic purpose is to "serve as a national index and network for 50 state criminal justice systems," according to the FBI. Several purposes, both concrete and abstract, are fulfilled by this centralized operation.

First, it has made unnecessary the preparation and sending of countless wanted posters and teletypewriter messages.

Countless manual reports, records and files no longer have to be maintained, let alone prepared.

And while these changes have not come without any local expense, much of this new equipment has been funded by the Law Enforcement Assistance Administration (LEAA) through state planning agencies.

Numerous Benefits

Unfortunately, NCIC cannot measure the amount of deterrent it provides, but that is true of most police activity. Numerous benefits abound, however. These include investigatory time saved and an increased apprehension rate for wanted persons as well as recovery of property.

After all others have been described, however, the ultimate benefit lies in the ability of a patrol officer to obtain knowledge about a vehicle and its occupants prior to his actual physical contact with them.

It is not necessary for NCIC to be a repository for all police information in the country. Herein lies the reasoning behind development of state, county and some large municipal information systems.

Late in 1971, NCIC added its eighth file. Known as the Computerized Criminal History (CCH), it developed from its forerunner project, the System for Electronic Analysis and Retrieval of Criminal Histories (Search), which was funded by LEAA.

Like the other NCIC files, CCH could not encompass all histories of all criminals. The NCIC staff and committees formulated certain criteria for the file which excluded all offenses which did not constitute true criminal activity. Drunkenness, juvenile delinquency and traffic offenses were some of the behaviors not considered.

It was further decided that it would be the responsibility of each state to determine the significance of each entry as well as entering, updating and modifying the records.

These records were designed to contain not only the personal descriptive data of the individual, but complete arrest and court information. Charges, single or multiple, are listed for each arrest as well as the arresting agency and date. Follow-up entries by the courts then provide adjudication dispositions for each charge.

Correctional institution entries show location of confinement as well as dates of entry and release. The CCH file is limited to a degree in that only agencies with a computer interface can request a copy of the entire record.

Some of the other security features practiced to ensure the confidentiality of CCH, as well as most other files, are:

- The ensurance of the physical security of participants' computer sites, as well as that of all remote terminal sites on-line for criminal history data.
- A limit on the number of personnel having access to terminal devices.
- The screening of all such personnel as well as all data center personnel having access to criminal histories.
- Maintenance of logs and other appropriate records to identify users of the file.
- Establishment of editing procedures to ensure file accuracy.

CCH has sparked a great deal of controversy. Privacy has been the primary topic of debate. Of great concern is the possible misuse of data in the file, the lack of timely validations, data inaccuracies and the lack of notations of court dispositions of criminal charges.

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Law enforcement officials have maintained that totally dedicated computer systems are necessary for file integrity while government officials have desired shared systems for budgetary reasons. A shared system is much more vulnerable to unauthorized access.

Under NCIC guidelines, each state's laws provide the criteria for handling records entered in CCH. Because of this lack of uniformity, some fear a less than acceptable handling and use of data in the file.

Massachusetts, which has some of the most protective legislation enacted, has opted not to join CCH. This action on its part has precluded any mishandling of that state's stringently collected and protected information.

The state's records are available to other law enforcement agencies through the more traditional channels of communication, but not to private concerns, such as debt collection agencies and insurance companies, that may have been able to gain access through a state with little or no restrictive legislation..

In addition to security safeguards, policy and law, follow-up procedures (editing) have been instituted and maintained to validate entries.

The files are periodically run through various computer editing programs which check the records and ensure conformity with a predetermined format. When certain portions of a record do not conform to a logical configuration, this is reported to entering agencies.

Earlier, when discussing the vehicle file, it was noted that American VINs are nearly unique. This is a by-product of an encoding method that vehicle manufacturers began more than 10 years ago.

Should a 1968 Ford be entered in the vehicle file, it must be accompanied by a VIN or the record will be purged after 90 days. If or when the VIN is included, it must be 11 characters in length. Using "A" to represent letters and "9" to represent numerals, the VIN must be of the form "9A99A999999."

Any deviation from this format would not pass the editing routine; the originating agency would be advised that its entry was in error and asked to obtain and modify the entry with the correct information.

It is quite evident that accurate information is the basis upon which elements of a criminal justice system rely. Information is that one medium which links the police to the courts, the judiciary to corrections, prosecution to rehabilitation.

Unfortunately, when information is unavailable, erroneous or incomplete, the system fails to operate with any acceptable degree of efficiency.

Daniel R. Kashey is director of the Monmouth County, N.J., Police Computer Office, which is in the last stages of acquiring a system that will link that county's 50 municipalities with the National Crime Information Center, the National Law Enforcement Telecommunications System and the New Jersey State Crime Information Center.

Kashey, who holds a bachelor's degree in criminal justice and is close to a master's in computer science, has six years' experience as a police officer.

In addition to his work with Monmouth County, he teaches courses on management information systems at Stockton State College.

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Editorials

Resource Sharing

The idea of resource sharing typified by the recent Datapoint Corp. Attached Resource Computer (ARC) announcement [CW, Dec. 5] — and to a lesser extent by the Sycor 445 — seems to be an idea whose time has come, or at least is on the way.

However, as with most concepts in the computer community, the final proof of whether resource sharing will be beneficial will be up to users.

If users find they can make efficient use of such systems, then the systems will be truly revolutionary. If users feel constrained from testing the new concepts, however, then the systems will have to be relegated to the scrap pile.

Too often in the past users did not try or even examine new concepts until the concept received the "IBM seal of approval." Examples of this type of thinking abound, but perhaps the best is virtual storage — pioneered by Burroughs Corp. but not widely accepted until IBM "invented" the idea.

Users will hopefully evaluate resoure-sharing systems on their merits and not wait until the idea is either endorsed or blackballed by IBM.

That's the only way innovative systems will get a fair test.

Curious Sense of Law, Ethics

The Society of Certified Data Processors (SCDP) recently granted Alan Taylor its first Founding Father Award, but in the process once again raised many questions about ethics.

The award to Taylor was deserved — he founded the society in 1971 — but the questions raised by the SCDP's press release on the subject are disturbing.

According to the society, Taylor's writings relate to the subject of "data processing ethics" in "two ways: (1) suggesting employers adopt a code of ethics for their data processing people and (2) reducing all the ethical-unethical debate down to one crystal clear point that 'breaking the law is unethical.' "

The phrase "ethical-unethical debate" reveals a limited and very naive conception of the term "ethics." The SCDP apparently believes human behavior can be uniformly judged in discrete portions as either "good" or "bad," one or the other. The society would decide which is which.

The SCDP thus chooses a dualistic scheme of ethics, foreign to the philosophies of millions of people apparently deemed incapable of ever becoming "legally recognized professionals."

As to "reducing ... debate down to one crystal clear point that 'breaking the law is unethical,' " this is an obvious self-contradiction and betreys a dangerous and highly argumentative supposition.

A point is never "crystal clear" from the start in a debate; that is why it can be debated.

Moreover, law breaking is not necessarily unethical. One can easily suggest many laws as "unethical" by a number of ethical schemes.

The SCDP meant "breaking the law is unethical" to be a tautology, which it is only if one surrenders to law as the only possible ethical scheme — a trait of the Auschwitz ovenkeepers, one should remember.

The society seems to have a curious sense of "law" and "ethics." What is at best its confusion imperils the civil liberties of the entire DP community.

The SCDP evidently accepts as an article of faith that data processing "professionalism" equals "legal recognition" equals SCDP membership equals subscription to the SCDP "code of ethics." But this is surely open to question.

It is, in fact, a political question, for the SCDP seeks to constrain behavior. The DP community should consider who intends to do the constraining and — especially — why they would want to.

Data Past

Five Years Ago
Dec. 13, 1972

ANAHEIM, Calif. — The Fall Joint Computer Conference that was held here this week marked the last of the twice-yearly shows sponsored by the American Federation of Information Processing Societies. The association decided to switch to a once-a-year format with greater emphasis on user topics.

Eight Years Ago
Dec. 17, 1969

WHITE PLAINS, N.Y. — Unbundled 360 compiler prices ranging from $40- to $275/mo were announced by IBM along with the Time Sharing Option for OS/MVT environments and the Interactive Terminal Facility for the 360/25 and up under DOS. The packages offered Basic and Interactive PL/I as well as two Fortran compilers, a Fortran library and an Ansi-standard version of Cobol.

— — —

CAMBRIDGE, Mass. — The Committee of Research Policy agreed unanimously to permit Harvard professors to participate as individuals in Project Cambridge, a controversial research project designed to develop computer techniques in behaviorial sciences.

Letters to the Editor

How Will Justice Prevail?

I am incredulous that the "privacy backers" are objecting to the Department of Health, Education and Welfare's Project Match [CW, Nov. 21]. The backers are more concerned over the preservation of the individual's privacy than over the detection and prosecution of fraud.

How will justice ever prevail if access to evidence of wrongdoing is denied to enforcement authorities by law and/or regulations?

David Lariscy
Atlanta, Ga.

Filling the 18-Minute Gap

I was very interested in the recent article on recovering information from erased tapes [CW, Nov. 28].

Recovering data from residual signal levels on tapes "even after intensive erasure" is theoretically sound and now obviously it is practical.

My first reaction to the article was: Let's send Sysco Engineering the Watergate tapes with the infamous "18-minute gap" and watch Washington jump!

Don Root
Columbus, Ohio

Less-Than-Fond Farewell

All the time I spent as a Computer*world* subscriber I was tempted to write letters to the editor but never was motivated enough. Now that my subscription has expired, with my blessing, I am finally motivated enough to write.

You consider yourself the computer community newspaper, yet I get multiple advertising letters as a result of your poor mailing lists.

My subscription has expired, but a month later, I still receive copies of your paper.

You waste endless amounts of paper rehashing the same endless arguments over certification and check digits.

You persist in printing childish and useless articles such as the ones in the Nov. 14 issue discussing the writing style of Frank Bindar ["Pompous Verbiage Clouds a Good Thesis . . ."].

You bore us with manufacturer articles about how a specialized piece of hardware or software fits a unique application with implications for all of about two people.

You announce endless products with little assistance in placing them relative to manufacturers' product lines and to other similar but well-known items.

Most DP magazines seem to cover all the important news once a month and do it adequately.

This is why I stopped my subscription. You claim to speak for the industry; what hurts is that you may be representetive of the industry.

Jerry Bennis
Springfield, Va.

More Meaningful Code

Ket Watters' letter ["Cobol Verb Suggested," CW, Nov. 28] suggested SPECIFY as a new verb to set a level 88 condition name. Until that happens, I would suggest he change his example code to the following:

```
05 MARITAL-STATUS-FLAG      PICTURE 99.
   88 STATUS-IS-MARRIED       VALUE 0.
   88 STATUS-IS-SINGLE        VALUE 1.
05 VALUE-OF-MARRIED         PICTURE 99 VALUE 0
05 VALUE-OF-SINGLE          PICTURE 99 VALUE 1.
```

This will allow the more meaningful "MOVE VALUE-OF-MARRIED to MARITAL-STATUS-FLAG" instead of "MOVE 0 TO MARITAL-STATUS-FLAG."

Les Bain
Toledo, Ohio

Computer*world* welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

Leadership Qualities Neglected

Narrow Views Lead to Dead-End DP Career

The Human Connection

By Jack Stone
Special to CW

And still another torrent of commentary from the readers! This time it's in response to my column on "behavior shaping" in the design engineering function (CW, Nov. 7).

One of the readers wrote a provocative letter on technical specialization. He stated that most DP managers are guilty of excessive concentration on the growth of the technological capabilities of their personnel, to the exclusion of the development of their managerial and leadership qualities.

He believes such practices have, in effect, backfired with respect to the careers of the managers themselves, since that technical specialization has cut short any growth up and out of the DP establishment.

But here's the way he put it. What do you think?

Dear Jack:

Mismanagement is indeed a problem in DP, but at all levels, not just those of design engineering. The particular chap in your column is only one of the great many whose talents and abilities are abused through mismanagement. Is it any wonder that employees seek one employer after another hoping to find, usually in vain, some professional managers?

One of the main functions of a manager, in addition to getting jobs completed, is to help develop employees into more valuable assets to the firm, particularly as DP managers. This requires looking upon employees as other than technical specialists pigeon-holed to work only in specific areas of expertise or as machines to be used for technical development. This means that the manager needs to have a human development plan for each employee to broaden his perspective and gain new knowledge that can be applied to jobs of greater responsibilities.

But such plans run counter to the career development practices of most DP shops. DP managers stress technical expertise and specialization to the almost total exclusion of any kind of generalist qualities. That employee hired as the inventory control specialist is on the payroll to perform that job and none other ...Thus pigeon-holed specialists remain in their pigeon holes, only gaining advancement by going to a new firm, but finding they are to specialize once again.

To development potential managers, the DP manager has to include some kind of program for managerial training to be taught to interested employees. This is not possible for most DP managers, because they know far too little about management principles, methods and techniques, having themselves been moved up from some role as super specialist or expert technologist. This entire process fosters and builds heavily upon the premise that you can only do what you have done before, that it is too costly, too time-consuming to train employees in new applications areas...

The unwillingness of upper management to promote DP managers into line functions is the inevitable outcome of hiring practices and qualifications demands that are based on technology specialization. Thus, DP managers perpetuate the very climate and conditions which limit themselves to a dead-end career path!...

Most DP managers do not curry development of fast-track employees who show marked potential for leadership because such persons would then become threats to the DP manager's job. These people are either held in check through repetition of poor assignments

(Continued on Page 22)

Exam Time Approaching

Test Yourself on 20 Sample CDP Questions

The Taylor Report
By
Alan
Taylor
CDP

The 1978 Certificate in Data Processing CDP examination is upon us, and practically the only question left is whether people who have not put in their applications should try out in one or more sections. Well, one way to decide this would be to try out the sample questions from the study guide. Then, if you want to know how you scored (I think you will probably know anyway), you can call the Institute for the Certification of Computer Professionals (ICCP) at (212) 888-3208. They can also help you with regard to applications, etc.

ICCP-Run Exam

The annual examination, run by the ICCP to establish high standards for data processors by emphasizing both breadth and practicality, has five sections — Data Processing Equipment, Computer Programming and Software, Principles of Management, Quantitative Methods, and Systems Analysis and Design.

The institute awards a certificate of excellence to the top scorer among the first-time participants in each section. The overall top scorer receives a $500 check along with the certificate.

The multiple-choice examination is open to all and fees are $35 plus $10 per section. It will be given all over the U.S. and in Canada on Feb. 16. If you need an application, then call that New York number immediately, as otherwise it will be too late for this year.

Here, then, are the sample questions:

Section 1. Data Processing Equipment

1. Which of the following computer characteristics will tend to result in a faster computer system?
   1. Buffered, serial, fixed word
   2. Asynchronous, buffered, parallel
   3. Parallel, buffered, asynchronous
   4. Synchronous, buffered, variable word
2. Which of the following statements concerning COM (computer output microfilm) is FALSE?
   1. COM devices basically photograph the image on a cathode-ray tube.
   2. There are two major types of COM devices, alphanumeric and graphic.
   3. Graphic COM devices are used primarily as substitutes for impact printers.
   4. COM devices can write characters at rates up to 500,000 characters per second.
3. Which of the following characteristics would likely apply to a direct access file utilizing indexes or dictionaries as its addressing technique when processing randomly?
   1. Randomizing formula
   2. Two accesses are required to get each record.
   3. Synonyms will be generated which will result in extra accesses.
   4. There will be a high incidence of gaps or unassigned physical records within the file.
4. In a microprogrammable minicomputer, the microprogram is stored
   1. in core memory.
   2. on magnetic tape.
   3. on a direct access unit.
   4. in read-only memory.

Section 2. Programming and Software

5. In Cobol, what type of condition is exhibited by the expression: A AND B OR D OR E?
   1. Or
   2. Complex
   3. Compound
   4. Exclusive or
6. A compiler would usually have to produce programs in the form of a relocatable object deck in order to make effective use of which of the following?
   1. Macro instruction
   2. Function subroutines
   3. Floating point operations
   4. Monitor programming control systems
7. Which of the following Cobol statements would link subroutine A to subroutine B?
   1. PERFORM 10 TIMES SBR-B THRU SBR-A
   2. PERFORM SBR-A THRU SBR-B 10 TIMES
   3. COMPUTE GROSSPAY = SBR-A + SBR-B
   4. IF TOTHRS IS GREATER THAN 40 GO TO SBR-A ELSE GO TO SBR-B
8. Every machine language computer instruction must contain which of the following?
   1. Operation code, only
   2. Operation code, operand
   3. Operation code, two operands
   4. Operand, next instruction address

Section 3. Principles of Management

9. Which of the following is not an important element in the question of lease vs. purchase of EDP equipment?
   1. Cost of money
   2. Tax considerations
   3. Maintenance expense
   4. Parallel operations cost
10. Which of the following would be considered an advantage in contracting for EDP systems applications work?
    1. Avoids maintaining a permanent staff larger than is required over the long term
    2. Avoids maintaining a large staff of systems programming people and reduces overhead
    3. The organization does not have to take the time to gain knowledge and experience
    4. A contractor acquires know-how about the company and can therefore be used in the future as an alternate source for make vs. buy opportunities
11. Which of the following items should not be classified as an asset for financial statement purposes?
    1. Deferred charges
    2. Retained earnings
    3. Land and buildings
    4. Accounts receivable
12. While strategic planning is heavily staff oriented, management control is heavily oriented toward
    1. financial managers.
    2. planning managers.
    3. marketing managers.
    4. operational managers.

Section 4. Quantitative Methods

13. If $y = 5x^3 + 3x^2 + 6x + 2$ which of the following is NOT a term of dy/dx?
    1. 6
    2. $6x$
    3. $3x^2$
    4. $15x^2$
14. With 2 letters or digits followed by 3 digits, how many codes can be created if the letters O, Q, and I are not to be used to avoid errors with 0 and 1?
    1. 66,000
    2. 100,000
    3. 1,089,000
    4. 1,296,000
15. If budgeted unit sales=10,000, selling price=$10, fixed costs=$18,000, and variable cost is 70% of sales, what is the break-even point?
    1. $25,714
    2. $60,000
    3. $72,000
    4. $142,857
16. To double the reliability of an estimate, which is the same as decreasing the standard error by half, the size of the sampling must be increased
    1. two times.
    2. four times.
    3. eight times.
    4. 16 times.

Section 5. Systems Analysis and Design

17. What would be the correct check digit (X), using the sum of the digits method, for the identification code 85463X?
    1. 2
    2. 5
    3. 6
    4. 26
18. In a real-time control system, each logical message requires 500 milliseconds of control processor time. Each remote control device requires synchronized service 5 times per minute. Which is the best estimate of the largest number of remote control devices that can be served?
    1. 10 thru 19
    2. 20 thru 29
    3. 30 thru 39
    4. 40 thru 49
19. Which of the following is NOT normally applicable in establishing the objectives of a systems study?
    1. Develop and design the data files
    2. Analyze and evaluate present operations
    3. Develop recommendations for change as required
    4. Review present and future corporate goals and objectives
20. Which of the following is the LEAST desirable purpose for conducting a post-installation systems audit?
    1. To isolate remaining problems
    2. To finalize system's documentation
    3. To identify the actual improvements made by the new system
    4. To determine if the system is performing according to specifications

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DP Careers Often Dead Ends

(Continued from Page 21)

which do not let them expand or else fired...

To find firms that develop their people for management slots is so difficult that in actuality very, very few DP personnel ever succeed as managers...

I do not think responsibility for the perpetuation of these abysmal conditions of management careers rests entirely with the DP managers themselves. Certainly the attitudes of upper management towards DP managers — that they are but so many technicians who are incompetent to rise higher — have also contributed to the close-endedness of DP careers.

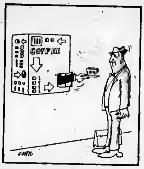
All too frequently, upper management stresses technological specialization as a must for DP management.

It is to be wondered how upper management ever expects these conditions to change when it also, through narrowmindedness and tunnel vision, perpetuates these limiting and limited viewpoints of DP.

Somehow, upper management has to be educated so it can adopt a wider view about DP functions and DP personnel. If not, the current conditions which cause 25% to 35% turnover of DP managers annually will continue, and DP as a long-range career will remain but a dead-end road which stops at the DP managerial level.

In closing, I'd like to ask where the desperately needed changes begin and when they will begin. Are we doomed to have DP always remain as it is today, a function of firehouse operations and management by panic?

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.



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CPE Methodology Helped

Cray-1 Evaluated Despite Site Problems

By Don Leavitt
CW Staff

WASHINGTON, D.C. — Several attempts to evaluate the unconventional power of the Cray-1 array processor from Cray Research, Inc. provided a study team with both information about the system and an evaluation methodology that ultimately worked well despite severe time and resource constraints.

The study was conducted jointly by the Federal Computer Performance Evaluation and Simulation Center (Fedsim) and personnel at the Los Alamos Scientific Laboratory (LASL). The Cray-1 was being considered as a replacement for one or more of the Control Data Corp. 7600s at LASL, according to Fedsim's David Lindsey.

One of the evaluation team's chief constraints was a need for demonstrable impartiality, Lindsey told attendees at the national conference held here recently by the Computer Measurement Group (CMG) and the Association for Computing Machinery's Special Interest Group on Computer Performance Measurement (Sigmetrics).

In addition, the team was faced with an established, inflexible deadline: The Cray-1 — "It was Serial No.1, by the way" — was on loan to the lab for six months, Lindsey noted.

But the building of a good test was hampered by a workload characterized by Fortran programs up to 50,000 lines long and by the absence of a Fortran compiler for the Cray CPU.

The initial absence of effective I/O for the Cray also added to the team's difficulties. The "primitive" operations environment of the Cray "severely limited" the programmers working on the test, according to Lindsey.

All communications with the Cray-1 was handled through a Data General Eclipse. Magnetic tapes prepared for other machines at the lab could be read, "but only after an elaborate translation procedure."

There was only one card punch and the Cray software was geared to a card format incompatible with other lab work, Lindsey said.

The initial evaluation method considered was based solely on the CPU cycle times of the two machines: 12.5 nsec for the Cray-1 and 27.5 nsec for the CDC 7600. The ratio of those two, 2.2, could naively be the speed ratio of the two machines, Lindsey acknowledged.

But that didn't work since they required different numbers of cycles and even different numbers of instructions to accomplish comparable operations.

The next proposal was to consider the frequency of instructions types used on the CDC 7600, assume there would be a comparable frequency of the same types on the Cray-1 and then compare the published execution times for the instructions on the two machines.

But that approach didn't take the differing overlap techniques into account, nor the different number of instructions used to get the same operation done, Lindsey pointed out.

Detailed simulation was rejected as an evaluation approach in part because the creation of an effective simulator would have required levels of support "far beyond the human and time resources available" to the evaluation.

The same could be said for benchmarking, Lindsey continued. That would have required, as the simplest level, recording the existing Fortran programs into Assembler language for each machine because the Cray-1 had no Fortran at that time.

The sequential rejection of each of those methods finally led the evaluation team to the idea of extracting benchmark kernels from existing CDC 7600 programs. These kernals must come from programs that consumed enough CDC 7600 time to merit conversion to the Cray-1, the team decided.

Beyond that, only programs that would continue to be used at current or increased levels and for which support for conversion existed within their own user groups would be used as a sample base, Lindsey said.

Five programs were selected for samplings, and every nth position in memory provided the base instruction for the benchmark kernel. The Fortran instructions on either side of the selected one were also included in the kernel, which was recoded in Assembler and executed on each of the machines.

The team decided that for the Cray CPU to be found acceptable, at least 50% of the kernels would have to run twice as fast on the Cray-1 as on the CDC 7600. If the results were inconclusive in the first small sampling, more kernels would be drawn until a decision was obvious.

"Fortunately for the health of the programmers involved," the Cray-1 passed all the tests in the first, minimum-size sample, Lindsey said. The speed ratios ranged from 4.12 to 2.03 and, when the basic tests were completed, closer studies showed the Cray-1 was not only faster but "cleaner" in design, he added.

CW at Sigmetrics/CMG

OS Files Compared by 'Accuchek'

NEWTON, Mass. — An OS file-compare utility that is said to obsolete IBM's IEBCOMPR is now available from Arkay Computer, Inc.

The IBM routine simply dumps unequal records on the printer in hexadecimal form without any indication of where the mismatch occurred while Arkay's Accuchek package underlines all bytes that are unequal, according to a spokesman.

Accuchek provides the user with a variety of options that include hex or character printouts, side-by-side listings for a "natural" and more comfortable comparison and field-by-field comparisons so irrelevant mismatches can be ignored, he said.

The control cards are very nearly free-form with a 10-column range for the start of the operation code and the ability to enter keyword parameters in any sequence, he added.

All control card entries are optional with defaults established for certain omissions, Arkay said.

The Accuchek user can also set parameters to limit printing to lines that contain errors. This averts the flood of paper that can accompany the use of IBM's utility, which does not have such selectivity, the spokesman claimed.

Printing by the IBM software will cease only after it has identified 10 consecutive error records or the end of the file, Arkay said. Accuchek's control cards include a parameter that can reportedly stop the run once any predetermined number of records or errors have been identified regardless of whether they are consecutive.

The independent's utility has the flexibility to process and match ascending key files, compensating for missing records, according to its vendor. Comparisons can be made on unequal length files or on unequal length fields; the user identifies what is to be compared and may specify what is acceptable filler when the things being compared are of different lengths.

Accuchek can process fixed, variable, undefined and Vsam files under any OS/VS environment, the spokesman said. Execution time is said to equal or surpass that of the IBM utility.

The package is available for $800. Arkay is at 24 Manor House Road, Newton, Mass. 02159.

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New Measures Sought

Obfuscation No Help to Anyone

By Don Leavitt
CW Staff

WASHINGTON, D.C. — Many of the traditional and widely used measures of computer system performance are obfuscatory: they measure the wrong things, the right things wrongly, or nothing at all, according to David F. Stevens of Lawrence Berkeley Laboratory, University of California.

DP management should avoid some of the older terms and adopt a set of measures that "illuminate, rather than obfuscate, the true external character" of a system, Stevens warned attendees at a recent joint meeting held here by the Computer Measurement Group (CMG) and the Association for Computing Machinery's Special Interest Group on Computer Performance Measurement and Evaluation (Sigmetrics).

The real problem, he acknowledged, is the ease with which words in the English language can acquire new meanings.

Stevens analyzed "availability" as an example of what he meant. That term once referred to the fraction of the time the system could be used. In DP jargon, however, it has come to be synonymous with "uptime" and is seen as the fraction of scheduled time the system is available to the computer center.

That "new" definition reduces the time base. Time devoted to preventive maintenance or operating system development and installation is excluded from "scheduled time," he noted.

The time considered "available" by DPers includes many periods when the system is not, in fact, fully usable. These include both start-up times and run-down times. Time devoted to rerunning lost or interrupted jobs is also counted as "available," Stevens said.

The "new" definition of availability is deceptive because these differences combine to give an impression of a much higher level of performance than that seen by the user. Even if DP is satisfied, the end user may not be, he warned.

CW at Sigmetrics/CMG

As an example of how different the view of the DP manager and the user can be, he described a one-shift operation with an hour of maintenance on Monday and an hour of system development time every day.

Startups take half an hour each and rundowns take half an hour before the system development time and an hour before the end of day, he continued. He further assumed a system crash for 15 minutes one day and another for an hour, each requiring start-up time afterward.

By the current defintion, this center had the system for 32.75 hours out of 34 for a seemingly respectable 96.3% availability. The user, however, would find the system available — in the sense of being able to accept his input — only 19.25 out of 40 working hours, or 48.1% of the time.

Discrepancies of this magnitude — "which are not uncommon" help to explain the failure of some DP managers to understand their users' cries of anguish and outrage, Stevens said.

Tests Suggest: Check Language

WASHINGTON, D.C. — The aggregate results of some recent experiments on the relative efficiency of various high-level languages tend to support the use of the languages in application areas for which they were designed.

But, according to Jerome W. Blaylock of Texas Southern University, the exceptions were sufficient to merit the consideration of using high-level languages for the solution of problems which differ from those for which the languages were meant to be used.

After describing tests he had run while at the University of Houston, he told a session of the recent Sigmetrics/CMG conference here "one possibility is to program selected applications in two or more languages to determine which is more efficient" on a case-by-case basis.

Even at the start of his experiments, he recognized that languages generally were created to cope with particular types of problems. But he wondered if an installation might not be better off using available compilers and people knowledgeable in their use than switching to another language just because it is more appropriate for some problem.

The hardware used by Blaylock was a Univac 1108 running under the Exec 8 operating system at the University of Houston computer center.

(Continued on Page 26)

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DDP Adds New Twist To Traditional CPE

WASHINGTON, D.C. – As long as distributed data processing (DDP) systems include a centralized CPU as a major node – "and in most cases, they will" – many of the traditional computer performance evaluation (CPE) techniques and measures will remain useful and important, in the view of Phillip C. Howard.

In addition, there will be less concern about the performance of minicomputers and other small units that make up the distributed part of the system, the publisher of *EDP Performance Review* predicted in a session at the recent joint conference here of the Computer Measurement Group (CMG) and the Association for Computing Machinery's Special Interest Group on Computer Performance Measurement and Evaluation (Sigmetrics).

However, he warned, there will be new considerations for the performance analyst, particularly relating to data base distribution and communications. If an installation decides to adapt the distributed approach, it will be to the analysts' benefit to track the results carefully.

They must be sure user services are improved, costs remain in line, and generally better DP operations result in the long run, he said. Otherwise the effort will have been a waste of time, effort and money.

At the top of his list of performance considerations for DDP systems, Howard raised the issue of economy of scale. He noted that in our present transition period there is no clear indication that centralized, decentralized or distributed systems are "automatically" the most cost-effective approach any more.

Data Bases

One significant characteristic of distributed systems, Howard continued, is the distributed data base. But a problem arises when there is a need for both centralized and distributed data, he said.

He cited an article in *EDP Industry Review* that suggested it makes sense to distribute a data base – more accurately, perhaps, to avoid consolidating a data base – if 80% of the data generated at a remote site is useful only to that site.

Because of the cost of communications and the limited capacity of communication lines, file transfers to and from remote sites must be kept at a minimum, he warned.

Traditional disk and mass storage optimization problems related to access time and space utilization still apply. Continuing attention must be given to such things as allocation of files across drives, optimum placement of indexes and channel assignments, he noted.

Disk Bottlenecks

As long as disk devices with relatively long access and data transfer times (relative to CPU speeds) are in use, they will be a source of system bottlenecks, Howard asserted.

Performance considerations related to a central mainframe running as a keystone in the DDP setting are much as they are in a conventional environment, with one or two additions, he continued. If offloading of some of the work, and probably some reduction in the size of the performance staff, doesn't take place as the DDP system matures, "It may be an indication that the entire basis on which the system is based is faulty."

Monitoring of the outer units may be worthwhile, he said, but only if there are a number of identical units doing the same thing.

Tests Suggest: Check Language

(Continued from Page 25)

The algorithms chosen were divided into two basic categories: scientific (with substantial computation) and business (with information processing emphasized). Blaylock had five "scientific" algorithms with arithmetic computations, iterative processes, functions and matrix manipulations.

The three "business" algorithms included I/O processing, report formatting and logical decision-making, he added.

Two subroutines were used to determine the execution times of the experiments. The first subroutine got the starting time and stored it in common. The second got the ending time, calculated the elapsed time to the nearest one-tenth of a millisecond and printed it.

Generally, the execution times for the Cobol versions of the experiments with computational characteristics were greater than those for the Fortran and Algol versions, but Blaylock noted several exceptions in which the Ascii-oriented Cobol versions were comparable to those of both Fortran and Algol.

The execution times for the Algol versions of the experiments were greater, almost without exception, than for the Fortran versions.

The experiments involving information processing as a major characteristic indicate that Fortran is, or can be, an effective alternative to Cobol. Algol was left out of these tests, Blaylock noted, because of file incompatibilities.

In further work on the comparative analysis of high level languages, the number and variety of algorithms chosen and the number of different program authors should be expanded, he said in conclusion.

Proceedings Available

WASHINGTON, D.C. – The 320-page proceedings of the Sigmetrics/CMG VIII conference are available for $35/copy from either the Association for Computing Machinery (ACM) Order Dept., P.O. Box 12105, Church St. Sta., New York, N.Y. 10249; or Ian K. Roome, CMG Treasurer, 17648 San Candello St., Fountain Valley, Calif. 92708.

Data Management Eased With Dictionary Use

By David Thomas
Special to CW

In the last year there has been a growing interest both in data management and, as a natural complement, in data dictionaries. Despite this interest there is still considerable doubt in the minds of many users as to what data management really is and why it is important both to themselves and to their companies.

This is strange because those same users were quick to spot the information-giving aspects of computing and have been instrumental in moving DP away from the bread-and-butter attitude of the 60s, when to have both the payroll and the sales ledger systems up and running was considered a major achievement.

Very few responsible managers still see their computer as little more than a mechanized clerk. Those same managements have generally realized that information means profits — provided it can be garnered and processed in time for its effects to be felt in the marketplace, on the shop floor or in the general administration of the company.

Number One Resource

In other words information — data — is a resource. Because of its tremendous versatility, it is arguably the most important resource a company has.

What makes it even more attractive is that the major part of the data used in analyses and management information systems is produced as a by-product of the bread-and-butter systems that were of such importance 10 years ago. It is the vast and growing source of data that forms the information side of the data resource.

For there is another side. No less important are the processes that use that information, particularly within the DP department itself, but also throughout the company as a whole.

Management of the data and the processes is essential. Like any other resource it can only be put to good use if it is controlled and organized in such a way as to become measurable. Whether this measurement is quantitative or qualitative is of little concern provided the result is justified, but without an earlier management stage no form of judgment can be applied.

This prior stage has been neglected in the past partly because data is, or appears to be, free and partly because, with the piecemeal development of systems that has taken place in the past, there has been little or no effective way of managing it.

Such piecemeal development is by definition uncontrolled development, necessitated by the learning process which has taken place among most users since the introduction of third-generation equipment. It is only now being realized that it is the relationships between items of data, as well as between the processes that use them, that are significant. Unfortunately, without some effective form of control these relationships cannot be recognized and therefore cannot be put to use.

Various methods of control have been attempted, particularly in those installations using data base techniques, but they have tended to concentrate on the information aspects of the data resource while ignoring the processes involved.

Additionally, if based on a manual system, the systems become so cumbersome that they are either discredited as being unworkable or a considerable staff has to be maintained to do no more than record which module uses which item of data.

By the time the interrelationships between all the modules that use a particular data element have been drawn, the average manual system is working to capacity and beyond, omitting questions of security and precluding the possibility of using those relationships in the generation of management reports or documentation. At best the situation can be created whereby the data resource is prepared for management rather than in the process of being managed.

Management of the data resource is identical in principle with the management of any other resource and the objective is the same — to reduce the capital cost of the resource while returning the maximum effective use of that resource commensurate with the needs of the company. When applied to data there are specific needs in terms of the need to avoid data duplication, the need to avoid data redundancy and a need to provide a centralized system, which is the only way in which extraneous data can be avoided.

An extreme example of an uncontrolled environment would be one in

(Continued on Page 28)

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Dictionary Use Organizes Management of Data

(Continued from Page 27)

which all programmers use names and data definitions of their own choice for any data items with which they are involved and then, having produced half a system, they all leave. The incoming staff would have to start the programming job all over again (and perhaps the systems work as well) simply to find out what everything referred to.

To a lesser degree this is what happens in a number of installations today, where whole rewrites of programs and modules are taken on simply as a means of avoiding the perpetuation of the problem.

It was this situation that led to the development of a number of data dictionary/directory packages such as Datamanager, into which MSP, Inc. has already poured nearly 30 man-years of effort. These systems are designed to provide a data management system independent of the actual mechanism of the corporate data resource, whether this is held using data base techniques or consists of a series of files. Additionally, the intention behind these sytems is that they should work equally well with manual systems and hand-generated information.

Datamanager works on its own data dictionary, which is a pool of information containing all details of the characteristics, attributes and usage of all corporate data. Most importantly, it keeps track of the complex interrelationships between different data forms. Studies carried out by the company suggest that an item of data is subject to an average of five such relationships, which helps to explain the enormous difficulties associated with a manual cross-reference system.

The details stored in the dictionary are data definitions rather than actual elements, and the dictionary can be described as a data base of those definitions which coexist with the corporate data resource. In other words it forms an image of the resource for management purposes.

Different Requirements

A brief look at any company administration quickly shows that data must be managed with two different requirements in mind: those of owners and those of users.

The owners are those who, quite literally, own data. They are the ones who are responsible for it in the way a buying department owns one set of information while the marketing department owns another, completely different set. The users of the data on the other hand are those who devise systems and programs which make use of that data on its owners' behalfs:

Owners can be quite independent of one another, and while some data is undoubtedly peculiar to its owning department, it is probable that in any company there will be some data which can be accessed by several departments. Thus, both a buying department and a marketing department need to know what has been sold, and the payroll department and costing department both need to know how long a man takes to construct a part.

The fact that this data is shared is immaterial to the owners (assuming there is no problem of security involved), but it is of great importance to the users. The users need this information so they can impose security checks if required and secondly, because the recognition of the double use of the item can prevent data duplication.

Controller Necessary

To coordinate the different requirements of owners and users, and to provide and oversee a standardized approach to the methods of expression of data definitions, it is necessary to have one person in control. The controller should be responsible for the creation of the data dictionary and for the establishment and maintenance of security levels.

The dictionary, in conjunction with the controller, acts as a form of clearinghouse for the requests of both users and owners. Provided the controller's functions are carried out efficiently, the corporate data resource can be subjected to a level of management not attainable by other means.

No Use, No Change

Without authority a user cannot access an item of data because its name and definition are unknown to him.

Nor can he create arbitrary data elements without the controller being aware of them.

Similarly, different owners can check to see whether that element already exists. If it does exist, a new owner can be established for it without either the new or any other owner being aware that the element is used elsewhere.

This then is the philosophy behind management of the data resource and the way in which software can help to bring effective management to a company's activities.

Thomas is vice-president of MSP, Inc. of Lexington, Mass.

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Modules Teach BAL

KANSAS CITY, Mo. — The Edutronics Group has added four course modules to its recently announced multimedia series on Basic Assembler language. "Instruction Formats" shows how to use BAL instructions.

In the "Assembler Process" module, the user is shown how the assembler source program is translated into machine language as well as what features the assembler has for debugging and documentation and how to use them.

The "Indexing" course module discusses the construction of tables and the use of indexing to retrieve data from them.

"Closed Subroutines," the fourth module, shows how to increase productivity by creating and reusing subroutines to handle specific tasks.

The modules are available under various rental agreements, Edutronics said from 3435 Broadway, Kansas City, Mo. 64111.

MVS Measurements Shown By Version of 'Plan IV'

PHOENIX — An update of an OS and OS/VS system performance measurement package from Capex Corp., Plan IV:MVS is said to provide installations using IBM's Multiple Virtual Storage (MVS) environment with the information needed for effective decisions at all levels of management.

Using data from facilities already built into most MVS systems — including SMF, MF/1, RMF1 and RMF2 — the package creates files and reports to highlight both past experience and future expectations.

The monthly trend report, for example, shows data for the most recent 13 months and a projection for the next half-year, a spokesman noted.

Another of the standing reports, an analysis of critical programs, lists the top 30 jobs and programs in 20 different categories.

Ad Hoc Reports

In addition to a series of reports produced regularly, Plan IV:MVS generates 34 analytical reports covering a time frame of up to 24 hours on an as-needed basis, the spokesman said. They provide support for capacity planning, service balancing and performance tuning, he added.

The package costs $12,000; lease and rental plans are available, Capex said from 2613 N. 3rd St., Phoenix, Arizona 85004.

Course Covers VS Concepts

ARLINGTON, Va. — Described as a comprehensive course of instruction that provides application programmers and systems analysts with the education they need to take advantage of IBM's VS environment, "Program Design for VS" is now available from Morino Associates, Inc.

The course covers the concepts and mechanisms of VS programming as well as effective design and coding strategies and guidelines.

Instructor's Guide

An instructor's guide for each module states the module's purpose and suggested timing and contains an outline of the material, explanations of the visuals provided and a detailed list of resources and references for the instructor, a spokesman said.

The Morino "package" includes the instructor's guides, student workbook and duplication rights to the materials.

It costs $1,800 and can be ordered from Suite 101, 1401 Wilson Blvd., Arlington, Va. 22209.

Rapidata Extends X2C

FAIRFIELD, N.J.— X2C, the high-level language for managing sequential or structured data bases on the Rapidata, Inc. remote-computing network, has been enhanced through the addition of automatic file input and transaction processing capabilities, the vendor said from 20 New Dutch Lane, Fairfield, N.J. 07006.

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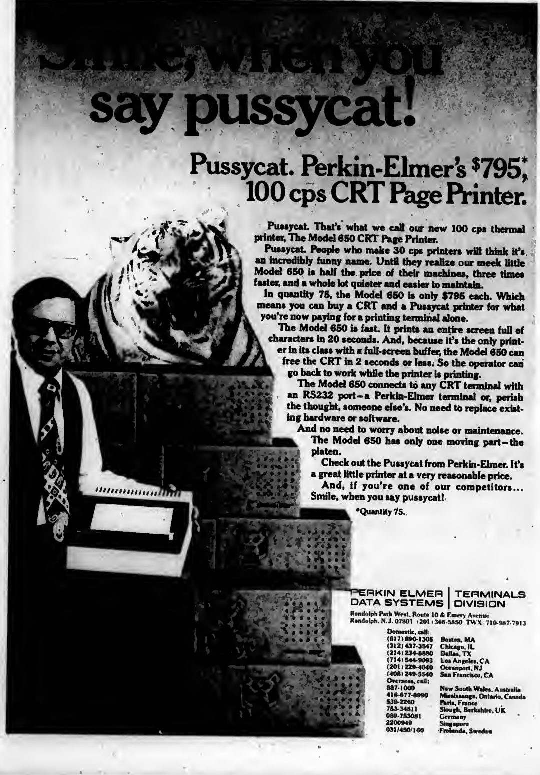

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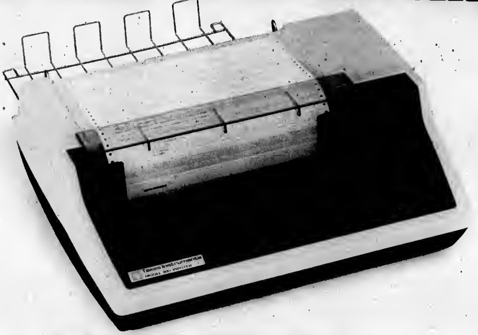

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Options include international character sets, full ASCII character set, expanded and compressed printing, forms length and vertical forms controls, and a variety of line interfaces.

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TEXAS INSTRUMENTS.

In Ansi Paper

Datagram Network Interface Supported

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — A datagram interface standard should be developed as an addition to the X.25 standard covering public packet data networks, according to a recent survey of U.S. network experts.

The survey was conducted by Task Group 7 of the Ansi X3S3 study group on public data networks and was sent to those listed on the X3S3 mailing list last August.

The present format of the X.25 standard adopted recently by the CCITT includes only a virtual circuit interface. But as a result of the survey, the Ansi U.S. study group is now recommending that the X.25 specification be "augmented" to incorporate a datagram mode of operation at level 3, the packet level.

Of the 19 respondents to the datagram survey, 15 agreed that a datagram service should be provided on public data nets, and there was general agreement that this should be provided on an international basis, along with a virtual circuit service.

Although many applications were mentioned that would be suited to operate on a datagram service, those mentioned most were electronic funds transfer, point of sale, transaction inquiry/response and network interworking.

Fourteen of those responding favored structuring the datagram interface standard onto the X.25 standard and this will be sent to CCITT as a formal recommendation.

Of those taking part in the survey, 10 represented the user community, five were from equipment vendors, and four were from common carriers.

Complementary Services

In supporting documents, the X3S3 paper defined the characteristics of datagrams as compared with virtual circuits. While virtual circuits are entities that have duration in time, datagrams have duration in data space. While the two are qualitatively different, they can provide complementary services, the Ansi document said.

Four basic assumptions were made with regard to datagram service. A datagram will be handled by the network as a "fully self-contained packet"; it will require a minimum of network functions; it will be used for interactive-type network traffic; and packet length will be appropriate for a "screen-oriented dialogue system."

Datagram service is organized around messages that are complete in themselves and are unrelated to other messages in transit between data terminals. Virtual circuit service is organized on the concept of providing service over a period of time during which one or more packets of information can be ex-

(Continued on Page 32)

DG Micronova Family Gets Communications Enhancements

WESTBORO, Mass. — Data communications enhancements for the Micronova family of 16-bit Nova-compatible microcomputers have been released by Data General Corp.

This range of hardware interfaces, software support utilities and communication packages gives users the ability to implement asynchronous and synchronous protocols and run DG's RJE80 (IBM 3780/2780) and IBM Hasp II emulation packages on a microcomputer system, the firm said.

Hardware consists of board-level components — an asynchronous muiltiplexer, synchronous line controller and cyclic redundancy check (CRC) generator — that plug directly into the Micronova chassis. DG's Communication Access Manager (CAM) provides software support along with the emulation packages, the firm said.

This combination of hardware and software support reportedly allows the Micronova to operate as a terminal concentrator, terminal cluster controller and as an intelligent terminal with extended communications capabilities. The communication subsystem, a subset of the Nova/Eclipse Communications Subsystem also makes it possible to configure data networks.

The Model 4226 synchronous line controller interfaces to medium-speed (9,600 bit/sec) synchronous/bisynchronous communication lines. It provides a full- and half-duplex EIA RS-232C/CCITT V.24 interface and full character buffering on reception and transmission. The 4226 costs $400.

Both idle and sync characters, as well as character size, parity and loopback testing are program-selectable. In the receive mode, Model 4226 automatically synchronizes data and then strips out the sync character. When coupled with the optional Model 4228 hardware CRC generator (priced at $250), the synchronous line controller can select either of two standard check polynomials — CRC16 or CCITT16, the company said.

(Continued on Page 32)

PDP-8/A Gains CRT Interface

MAYNARD, Mass. — A CRT interface/controller permitting single or multiple standard CRT monitors to be interfaced to the Omnibus of a PDP-8/A processor is available from Digital Equipment Corp.

Designated the VK8-A, the interface/controller permits more flexibility in configuring custom CRT systems and has the capability for keyboard printer and control signals, DEC said.

The VK8-A converts Ascii data into a composite CRT signal capable of being displayed on any CRT monitor conforming to the 525/625 line television standard, a spokesman added.

A total of 127 different displayable characters, including both upper and lower case Ascii sets, can be displayed by the interface; characters are generated in a 9 by 7 matrix for upper case and a 9 by 9 matrix for lower case.

The CRT presentation totals 1,920 characters, displayed in 24 rows of 80 characters each, and is held in a memory on the interface/controller. Up to 16 VK8-As can be put on a PDP-8/A computer.

Provisions that permit the user to develop a customized CRT terminal I/O system, such as keyboard input, printer output, sense line and output line connections, are standard features. CRT monitors located as far as 1,000 feet can be driven by the VK8-A output, DEC said.

The VK8-A is said to give PDP-8/A users an increased degree of flexibility in communication to and from their computers. The VK8-A permits the establishment of multiscreen presentations of output from a computer system, a capability that is useful in applications where people in a large area, such as a school or airport reservation counter must be able to see simultaneous presentations of data, the spokesman said.

The VK8-A permits four modes of character presentation. A character may be seen as "normal" — standard brightness — dim, blinking, or underlined. Improved resolution of the characters makes the VK8-A suited to drive monitors with screens larger than those normally associated with CRT terminals, DEC said.

The VK8-A costs $995, the company said from Maynard, Mass. 01754.

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DG Enhances Communications for Micronova

(Continued from Page 31)

Standard modem control is supplied for Bell 201, 203, 208 and 209 series data sets. This synchronous controller also supports IBM Bisynch protocols with full transparency and is program code compatible with the SLM-2 Series synchronous multiplexer used on Nova and Eclipse processors.

Up to four controllers can be configured with a single Micronova microcomputer allowing it to control a maximum of four synchronous lines. However, only one CRC generator board is needed per system, DG said.

The Model 4227 asynchronous line multiplexer controls up to four asynchronous communication lines. Each line can be configured for RS-232C or 20-mA current loop operation and individually programmed for number of bits per character (5 to 8), number of stop bits (1, 1.5 or 2), line speed 50 bit/sec to 9,600 bit/sec) and parity (odd, even or none). When enabled, parity is automatically checked/generated on each line, the firm noted.

The asynchronous hardware supports full- and half-duplex operation. It reportedly provides full character buffering on reception and transmission, program-controlled loopback testing and modem control with automatic-answer capabilities for Bell 103, 202 and 212 Series data sets.

A Communications Access Manager (CAM) provides software support for the Micronova communications subsystem. CAM, operating under the diskette-based Disk Operating System (DOS) and Real-Time Operating System (RTOS), supplies a utility for implementing application programs requiring asynchronous teletypewriter and synchronous/bisynchronous (including IBM Bisynch) protocols. It also includes Comgen, a utility that allows the configuration of communications software via an operator console dialogue. CAM is available for a license fee of $100.

In addition to CAM, separate software emulation packages let the Micronova communicate with any DG or IBM host processor using DG's RJE80 or (IBM 2780/3780) or IBM Hasp II workstation protocols. Implementation of these remote-batch capabilities provides users with a range of standard communications facilities across DG's product line, the firm said.

RJE80 supports single-stream remote job entry tasks, while a Hasp II RJE workstation multileaves up to seven input and seven output data streams for maximum use of system resources. RJE80 costs $1,250 while Hasp II carries a $1,500 license fee.

Both emulation packages allow batch terminal systems to send jobs to remote systems (IBM 360/370 compatible systems or other Micronova, Nova or Eclipse systems) for processing and to receive data files for printing or storing at the local site. Both also check data validity using a CRC-generated block check character and employ data compression techniques to improve line utilization, the firm said.

First deliveries of communications enhancements are scheduled in 90 days, from Data General, Route 9, Westboro, Mass. 01581.

Standard Urged By Net Experts

(Continued from Page 31)

changed in a sequential fashion between data terminals.

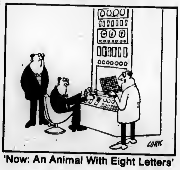
A datagram service would lend itself to transaction-oriented applications because it does not require the set-up and clearing procedures needed with virtual circuits. "Depending on the application, the use of permanent virtual circuits may be prohibitively expensive," the Ansi document said.

Because the datagram service would treat each datagram independently, the network users would be free to construct protocols at level 4 (of X.25) which employ a variety of criteria for packet ordering and processing without the delay overhead of explicit sequencing by the public data network, the paper said.

Datagram traffic can be freely routed across any available link to "multihomed hosts" through any series of internetwork gateways without the need to maintain state information relating datagram packets to each other at source or destination data communications equipment.

For user applications not requiring network sequencing, networks would have a wider range of routing options and could enhance their transparency to intermediate failures with a datagram service, the paper said.

Interconnection of public data nets with private, local nets would be considerably simplified through the use of a public network datagram mode of operation. There would be no need for the gateways between private nets and public nets to set up and clear virtual circuits with a datagram mode.



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Coupler Bows

IRVING, Texas — Vardon & Associates, Inc. has introduced the TC3002, a hard-wired acoustic coupler/modem.

The TC3002 provides both originate and answer modes and operates at data rates to 300 bit/sec.

The unit is said to provide asynchronous operation with phase-coherent FSK modulation, full- or half-duplex, acoustic or Data Access Arrangement (DAA) transmission over the dial-up telephone network and feature signal/noise ratio carrier detect circuitry that suppresses erroneous or false data.

The TC3002 carries a one-year "unconditional warranty." It costs $235 from Vardon, 930 N. Beltline, Irving, Texas 75061.

NCR Introduces Two Models

Retail System Features Modularity

DAYTON, Ohio — NCR Corp. has introduced the 2140, a retail terminal system with modular technology that reporteldy allows the user to tailor equipment features and upgrade capabilities as the need arises.

The flexibility of the 2140 system derives from its modular design, which in turn is based on the use of advanced microelectronic components, NCR said.

Instead of using a single microprocessor to control all of its functions, the 2140 can employ several — each doing a specialized task, yet working with the others as part of the total system, a spokesman explained.

NCR-developed microprocessor and memory devices on a single circuit board provide basic transaction processing and cash control features in the 2140 family.

When the retailer wishes to add greater performance, such as the ability to record data on magnetic cassette tapes so it can be automatically processed later, all that is required is the insertion of a second circuit board in the system and plugging in the required peripheral, NCR said.

Other performance features, such as the ability to automatically read merchandise tags with a scanning device or the ability to automatically read information encoded on the magnetic stripe of a plastic card, can be added in the same manner.

These additional "performance modules" reportedly include:

- Data communications to a DP system at another location.
- Data consolidation, in which one "master" terminal automatically summarizes totals for up to 15 other units connected with it.
- Memory capacity up to 128K bytes (large data memory in a single terminal can be shared by other 2140s linked with it).
- Electronic funds transfer transactions.
- Up to three printing stations.

The 2140's design conforms with NCR's recently announced Distributed Network Architecture. "This will result in future tangible savings in communications costs to 2140 users," the spokesman said.

The first two models of the 2140 family are for general-purpose use. The basic version of the first model, the 2140-2000, features a 17-column, twin-station alphanumeric printer for journal, receipt and forms validation, the choice of two display panels and up to 50 totals. Prices for the 2140-2000 begin at $1,995; first customer deliveries are scheduled for later this month.

Basic versions of the second model, the 2140-7000, offer additional features including a choice of printer combinations, larger electronic memory providing up to 225 totals and the ability to display instruction messages to lead operators through complex transactions.

Prices of the 2140-7000 start at $2,495. Customer deliveries are scheduled to begin in the first quarter of 1978.

The 2140-2000 model can be upgraded in the field to a 2140-7000, NCR noted. Additional capabilities such as communications or automatic wand reading can be added to basic versions of the 2140 as needed — either when the terminal is installed initially or at any future time.

The general-purpose 2140 systems are said to "complement" NCR's current line of electronic cash registers — the 210, 220, 225, 2135 and 250.

GIC Adds Two POS Offerings

NEW YORK — General Instrument Corp. (GIC) has announced two additions to its Unitote/Regitel electronic point-of-sale (POS) systems.

The products are the Model 651 remote store controller and the Model 655 backup data capture unit.

The Model 651 provides POS capabilities for stores previously considered too small to support a full-scale minicomputer-based system, GIC said. The Model 655 was designed to provide "a third level of assurance" to the process of capturing retail sales data, a spokesman said.

The basic system price for the remote store controller, Model 651-20P, which can handle up to 20 POS terminals, is $11,800. The basic system price for the Model 655 is $10,000.

GIC is at 1775 Broadway, New York, N.Y. 10019.

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Datapoint Users Get Multiterminal Emulation

SAN ANTONIO, Texas — Datapoint Corp. has released the Multiple Terminal Emulator (MTE), a software program designed to provide users with a flexible data communications system.

MTE can be executed on any Datapoint 1100, 2200, 5500 or 6600 disk- or diskette-based processor with at least 16K bytes of memory; it enables the system to emulate most IBM remote job entry terminals including Hasp, RES and JES workstations, Datapoint said.

MTE combines the similar disciplines of most emulators into one common system so that a more uniform operating procedure is possible, a spokesman said.

This allows an easy transition between the different types of emulators that can be utilized and minimizes the time it takes to train personnel to operate the system, he said.

In a typical implementation of MTE, the operator keys in data to update or produce data files. When this data is ready for transmission to the mainframe, the operator types in "MTE" to have a menu screen displayed. This allows the choice of emulator to be made by a keyboard entry.

Assigns Peripherals

The assignment of peripherals is also accomplished by means of keyboard instructions. This provides for quick modification of system configurations and allows peripherals to be assigned according to the requirements of the job to be performed, rather than according to the special requirements of the terminal emulated, Datapoint claimed.

For instance, data which would normally be routed to a printer using IBM 3780 protocol can be assigned, using MTE, to a magnetic tape drive for processing of data before it is routed to the printer.

MTE will operate at speeds of up to 4,800 bit/sec on Datapoint 1130 and 2200 processors using either the 9404, 9405 or 9481 communications interface and the appropriate communications modem.

Using the 9481 interface with the Datapoint 1150, 1170, 5500 or 6600 processor, MTE can operate at speeds of up to 9,600 bit/sec. MTE will execute at up to 4,800 bit/sec on these same processors when they are equipped with the 9404 or 9405 interface, Datapoint said.

Three Implementations

MTE can be implemented by any one of three methods, the spokesman noted. Datapoint's Disk Operating Sytem (Version 2.4), which is necessary for MTE operation in any mode, can be used to initiate the emulator package in a point-to-point system.

MTE can also run under either partition of the Partition Supervisor, a program which allows two programs to be executed at once. When executing MTE under the Partition Supervisor, a 5500 or 6600 processor (with either a 9404, 9405 or 9481 communications interface) is required, the company said.

Another method of implementing MTE is through the Chain facility, a job control library function wich is used to execute MTE sequentially with other programs.

The Chain facility — along with the Auto-Call, Auto-Answer and Auto-Disconnect features provided — allows MTE to run in an unattended mode when executed as an IBM 2780, 3780, 2770 or 3770 terminal.

This feature not only allows for the unattended transmission and reception of files during off-hours, but also permits the user to take advantage of processor and telephone facilities during those hours when they would otherwise remain idle, the spokesman said.

The MTE software is available for a one-time distribution charge of $45 from Datapoint, 9725 Datapoint Drive, San Antonio, Texas 78284.

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Net Design Seminar Slated

NEW YORK — A three-day seminar titled Computer Communication Network Design and Analysis will be presented by Columbia University on March 13-15 in New York and May 15-17 in Chicago.

The seminar reportedly offers an exploration of aspects of network design that are applicable to computer and multipurpose data networks. The program confronts major design questions relating to entry and combining of messages into networks from many different terminals as well as the problems of transmitting messages to remote locations.

Specific seminar topics include examples of networks, capacity assignment in networks, cost trade-offs, elements of queueing theory, concentration and buffering in store-and-forward networks, centralized network design, routing and flow control, polling, random access techniques and line control procedures.

The seminar leader is Dr. Mischa Schwartz, professor of electrical engineering and computer science at Columbia University. Details are available from the New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.

IBM vs. AT&T to Be Datacomm 78 Topic

WASHINGTON, D.C. — The long-term strategies of IBM and AT&T — and the collision course those strategies seem to signal — will be the focus of a presentation at Datacomm 78 to be held Feb. 21-23 at the Sheraton Park Hotel here.

Charles P. Lecht, president of Advanced Computer Techniques and author of the forthcoming book *The Waves of Change,* will discuss the "impending clash" between the two giant corporations and explain why and how he feels either side could win that confrontation.

Following his presentation at Datacomm 78, Lecht will participate in a panel discussion with John Eger, former head of the federal Office of Telecommunications Policy and now a consultant on communications law and regulatory policy; Frederick C. Withington, computer industry analyst with Arthur D. Little Corp.; and E. Drake Lundell Jr., editor of *Computerworld.*

Session topics at Datacomm 78 include data communications network , architecture, network security, data communications software and product trends in such areas as modems, multiplexers, facsimile systems and data entry.

Details on program topics and registration information is available from The Conference Company, .60 Austin St., Newton, Mass. 02160.

Interdyne Offers Buffered Device

VAN NUYS, Calif. — An intelligent buffered data terminal, Model ICS 3801, is being offered by Interdyne Co. It uses an Ansi/Ecma Philips cassette drive and is RS-232C compatible. It has an editable data buffer that holds up to 260 characters, a block rewrite capability and allows insertion of blocks or entire paragraphs into previously written text.

Features include .5M byte of storage per cassette, switch-selectable asynchronous transmission rates from 110 bit/sec to 19.2 kbit/sec, Ascii text as well as transparent binary modes, fixed or variable block length and auto error check and retry.

The ICS 3810 is designed for connection to printers, CRTs, modems, computers or other terminals. It costs $1,950 from Interdyne Co., 14761 Califa St., Van Nuys, Calif. 91411.

Correction

The manager of information services for Korvettes [CW, Nov. 28] is Morton Weitz.

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Terminal Offers Two Languages

BOHEMIA, N.Y. — Megadata Corp. has introduced the 700/DL, a dual-language terminal it said can operate in English plus "any other language" such as Cyrillic, Farsi, Hebrew or German.

"Dual-language" does not simply mean two character sets are displayed on the same display screen; it requires the display of both languages with all the text-writing requirements for two totally different written languages, the firm claimed.

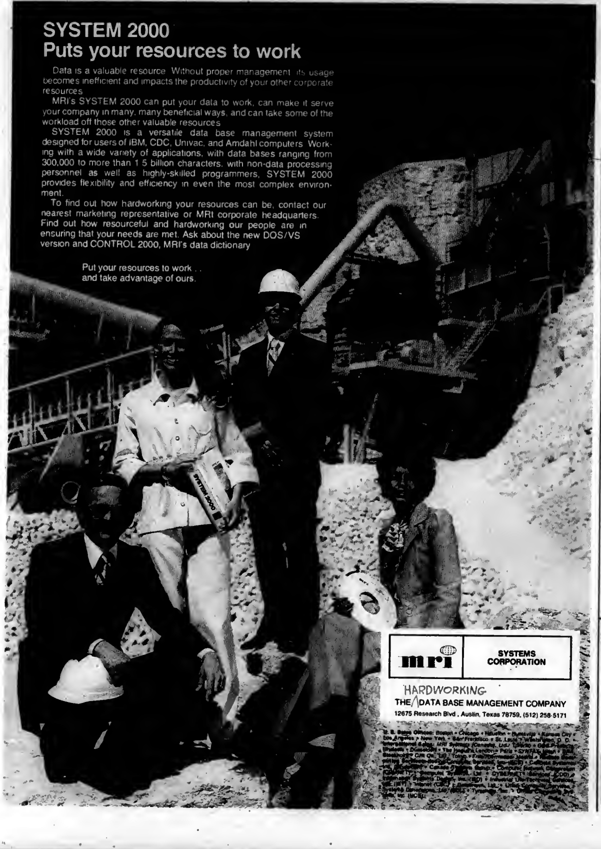
Both character sets are of sufficient quality that a readable English/foreign language font is displayed, according to a spokesman.

Entering Data

Another feature of the 700/DL is the ability to enter data from right to left or left to right, the company said.

Characters are displayed in a 10 by 15 matrix, and the terminal is said to include necessary insert, delete and text-editing features. The 700/DL features a memory of up to 73K, a 126-station keyboard, a 15-in. diagonal display and transmission rates from 50 bit/sec to 38.4 kbit/sec, the spokesman noted.

The dual terminal is reportedly available with interfaces and protocols for most popular mainframe computers. It costs $5,800 to $6,850 depending on quantity. Megadata is at 35 Orville Drive, Bohemia, N.Y. 11716.



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Recorder Includes Rate Converter

BALTIMORE — Columbia Data Products, Inc. has introduced a data cartridge recorder with a built-in transmission converter.

The Model 300C was designed to connect between a modem/CPU and a terminal with an on-line/off-line storage capacity of 1.5 million characters.

The 300C is equipped with dual RS-232 ports and a 512-character buffer to accomplish the rate conversion, according to a spokesman.

Speeds are selectable from 110 bit/sec thru 19.2 kbit/sec with current-loop capability in the terminal port, he added.

In the on-line mode, characters received on one port are immediately retransmitted on the other port at the preselected baud rate. In those cases where a large amount of data is to be transferred, the data can be written on tape and then transmitted.

Design of System

The system was reportedly designed for connecting a slow terminal to a high-speed computer while providing a reliable storage device.

The 300C can be controlled remotely by using Ascii control codes or manually with front panel switches and numerous status indicators, the spokesman said.

Optional features include auto answer, Bell 202 modem controller, rack mount, 220 Vac and customized software. The unit costs $1,995 from Columbia Data Products, 6655 Amberton Drive, Baltimore, Md. 21227.

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Cuts Divisional Costs

Corporation Centralizes Data Entry Task

BARBERTON, Ohio — Five Babcock & Wilcox divisions, each with its own computer or on-line access to a central computer, are using a centrally located key-to-disk data entry system to lower the cost of preparing batch material for processing.

"While it is impossible to say exactly how much this saves, it probably totals thousands of dollars a month in personnel and hardware costs that the individual divisions otherwise would have to spend," according to Data Entry Supervisor Anthony Stock.

Babcock & Wilcox (B&W), a manufacturer of power generating systems for public and private utilities, is in a unique position to establish this centralized data entry arrangement, since the five divisions are situated close to each other. Two divisions, Fossil Power Generating, Nuclear Equipment and Group Staff departments, all are located in the same facility here, while the other two, the Construction division and Industrial and Marine, are no more than 10-miles away.

"Companies or divisions with computers distributed throughout different departments also can benefit from this arrangement," Stock added, "particularly those now using keypunch machines for data preparation."

With the centralized system — based on Inforex 1303 units — B&W also has reduced data entry costs $6,000 a year while speeding data preparation time some 10%, he added. Half the dollar savings, he explained, has come from a reduction in previous keypunch and disk-to-tape hardware cost, the other half from the elimination of punched cards and the need for a second shift.

The improvement in data entry speed, he continued, is attributable to automatic generation of format codes, which means keyboard operators need not include program instructions along with source material, and to the replacement of mechanically based keypunch machines with the all-electronic system.

"With centralized data entry, turnaround time is almost the same as if data were entered and transmitted through remote job entry to B&W's IBM 370/158 mainframe," Stock stated. "Source material hand-delivered or mailed each day by the different divisions to the Inforex system is immediately entered, then processed and printed — usually on the same or the following day."

On an average day, upward of one million keystrokes are performed on the system, Stock noted. All the data is placed initially on Inforex disk, from which it is then transferred to 9-track, 800 bit/in. tape.

"What is physically entered at a keystation and what ultimately is released on tape for processing is entirely different, however, in respect to the way data is arranged," Stock said.

"With a keypunch system, each operator has to maintain a set of program cards, then select the proper card for each job entered. Finding the right card sometimes can take a minute or longer; sometimes a card is wrong and the job has to be repeated," he said.

If incorrect information is punched on cards, duplicate cards with the correct information have to be punched and fed manually into the deck — a very time-consuming process. However, these corrections can be made in seconds with the Inforex system, Stock said.

"All we have to do is call up the appropriate program, make the change, then let the system do the rest," he pointed out.

Before installing the Inforex 1303 in August 1975, B&W used 10 Mohawk Data Sciences Corp. key-to-tape stations, seven Univac 1710 and eight IBM 129 buffered keypunches for centralized entry of batch information.

"Recognizing that we might encounter some transition problems, we limited this initial Inforex installation to one controller and eight keystations and used it in conjunction with our other data entry devices. In December 1975 we added another 1303 controller and eight more keystations," Stock stated.

Five divisions of Babcock & Wilcox are using a centrally located key-to-disk data entry system.

"By April, 1977, we had added another 1303 controller, six more keystations (bringing the total to 22), dropped the remainder of the previous hardware and switched from an 18-person first shift, six-person second shift to a 22-person, single-shift operation."

Stock noted this reduction in hours did not occur because of any major reduction in volume of jobs or any change in the data submission schedule of the different divisions. "The ability to accommodate different types of information through the system was just that much faster," he said.

"For example, using an Inforex keystation, an average operator can generate approximately 9,000 keystrokes an hour and an experienced operator about 14,000. Using a keypunch station, an average operator can produce only about 7,000 keystrokes an hour and an experienced operator about 11,000.'"

College's System Pools Student Records

SYRACUSE, N.Y. — Syracuse University here has consolidated its student information into an integrated on-line records system that lets university personnel provide immediate answers to questions about grades, admissions and finances.

The system makes it possible for prospective students to learn the status of their applications by telephone in seconds. It also lets confused freshmen have errors on class schedules corrected immediately, and apprehensive students can be reassured sooner about the status of their applications for financial aid, according to Thomas F. Benzel, manager of student data systems.

The system maintains a student's records from the time of application through graduation. Besides maintaining records for the admissions, registrar's and financial aid offices, sections of the system support the administrative work of the various schools and colleges at the university.

Benzel said the frustration of students attempting to find answers and employees trying to provide them has been substantially reduced. And the system, which took 2-1/2 years to design and implement, has many far-reaching effects.

"I'm very proud of what we've done," Benzel said. "As far as I know, no one else has undertaken the whole reorganization of a student recordkeeping system in just two years."

The student is the common denominator in the system, which ties all the formerly unrelated areas together. Admissions, financial aid and the registrar's functions have been integrated, eliminating much overlap. With the old method, "once a folder got started moving, it became caught up in the bureaucratic snarl," Benzel said.

Locating the file and its information is no longer a problem.

In admissions, the new records system keeps an inventory of all the required documents and the status of a student's application is available at all times, he noted.

Benzel said the on-line system is much more convenient than the old system. Now clerks can update information by typing in changes at a CRT terminal. The changes can be checked by having the computer either display the information on the CRT terminal's screen or print a hard copy on a matrix printer in the office.

The old system used batch processing, where changes were punched on data cards and read into the computer by a card reader. Verifying changes required programming the computer to print an audit trail on a line printer located at the computing center. Errors then had to be recycled through the batch process.

When it came time to upgrade the university's student information system, a review of the former batch-processing system revealed it to be more useful as a repository for historical information than as a basis for a new information system.

HEW Grant

In 1975, a $220,000 grant from the Department of Health, Education and Welfare enabled the design of a new system that would integrate the information required for university and student records administration.

The system is based on an IBM 370/148 that contains 2M bytes of memory, a spokesman said. Peripherals include four 6250 dual-density tape drives, 10 Memorex Corp. disk drives — four single-density and six dual-density — with 1.6 billion bytes of storage area, an IBM printer capable of speeds up to 1,100 line/min and a remote job entry terminal that is kept in the programming area, he added.

"The time required to process admissions applications has decreased substantially. The processing of admissions applications is a month ahead of last year," he said.

Corrections which took all semester can now be handled at once, and the working environment is more productive and stimulating, he added.

Adding Instructional Services

Center Meets Business Needs for 700 Schools

By Tim Scannell
CW Staff

HOUSTON — A central DP center here, serving 700 public schools in Texas, uses two Control Data Corp. Cyber 172 systems for most of the schools' "business" DP needs.

The Gulf Texas Multi-Regional Processing Center (MRPC) serves nearly 700,000 students and has the most powerful computing facility, in terms of capacity and speed, of the eight centers that provide DP services to the Texas public school system, according to Arley Carter, DP director of the MRPC.

The Cyber 172s are linked and share 500K bytes of memory, a spokesman said. The system also includes shared files of 18 CDC 844-2 disk units that are capable of recording two billion characters of information and a 580-12 printer with a speed of 1,200 line/min, he reported.

Remote terminals — 235 in all — are installed in schools and district administrative offices provide about 70% of the system's input, the spokesman added.

The system is managed by a staff of 96 technical, administrative and educator personnel and is patterned after a typical business application, Carter said.

It not only handles student files, scheduling, grade reporting, attendance, test scoring and personnel accounting and payroll, but it performs research and statistical analysis, model simulations and specially formatted reports that might be required by state and federal government, he added.

The 172s are also responsible for the annual production of more than one million paychecks, and the system produces 96,000 pages of computer printout weekly for the Houston Independent School District, which includes 230 schools, he said.

Operational Since '72

Growth in computer use has been rapid since 1972 when MRPC became operational with a CDC 6600 system, according to Carter.

All of the jobs for processing, at that time, were brought to the center by a delivery service and were returned to the users a few days later, he claimed.

But as the network grew, so did the need for a larger computing facility and in 1976 the 6600 was replaced with 172s. Terminals were then utilized to achieve faster turnaround.

The system makes use of on-line application and communications between the remote terminals and the central computer, Carter noted.

"For example, daily attendance data relayed from a school's terminal to the computer is rapidly processed and the names and home telephone numbers of absent students are printed out at the school within an hour. School officials then selectively call the absent student's home for a report on his whereabouts," he said.

In addition to operational and management services, MRPC is moving into instructional computing, Carter said. Through the various terminals, students can participate in computer-assisted instruction, have access to vocation-counseling information and develop and test computer programs and learn the operation of computer equipment.

Teachers also benefit from the system's facilities because they are able to track a student's progress as he proceeds through a computer-assisted learning sequence and select appropriate test items from a data bank that includes instructional resources, diagnostic references and course content, Carter said.

The MRPC system has been enhanced by the installation of high-speed synchronous communications lines to large districts that have a heavy data workload. Also, in order to maintain such an extensive geographic network, with some users almost 200 miles away, MRPC uses a front-end teleprocessing minicomputer to facilitate communications, he added.

The Houston Independent School District, which is the largest, also has its own on-site CDC System 17, which is linked with the Cyber computers at MRPC. Data is put on magnetic tape at this site and then transferred to MRPC for final processing and printing, according to a spokesman.

Integration into the Cyber system eliminated the need for an IBM 370/-145 computer that was formerly used by the Houston school district. The IBM machine is slated to be moved to Houston Community College in 1978,

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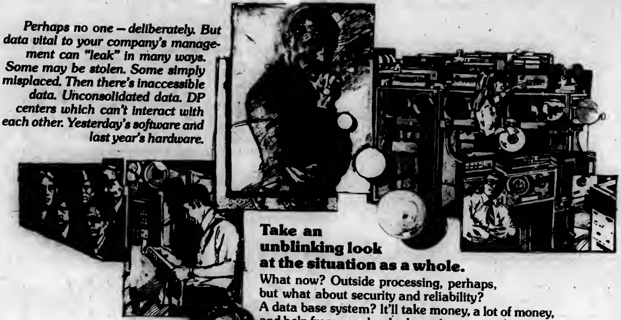

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User Credits Vendor for Ease in Four Upgrades

By Brad Schultz
CW Staff

NEW HYDE PARK, N.Y. — A private courier service which has experienced a 12-fold increase in sales over the past 11 years credited its success to staying with one vendor during its hardware growth.

Honeywell Information Systems, Inc. "has had an especially supportive attitude throughout our continuing expansion, always having the right computer system ready for us at the right time," Thomas F. McCloskey, vice-president of Puralator, Inc., said in describing the experience of Puralator's Services Group.

HIS anticipated Puralator's growth by suggesting a Model 120 in 1966, when most computer vendors saw the firm as "small-time," McCloskey said.

Handling payroll and "basic business functions," the Model 120 featured 8K words of main memory, three tapes, a card reader and a printer.

"Before that, our accounts receivable system consisted of carbon copies of invoices," McCloskey said. "Putting it all on cards made the accounting a breeze — for a while, anyway."

Three More Upgrades

Considered outgrown in 1969, the system was replaced by a Model 115 with 32K words of main memory, four tapes and a disk drive.

Two years later, the Model 115 had also been outgrown. By that time, annual sales had climbed to $82 million from $16 million in 1966. So in 1971 the 115 was replaced by a Model 2050 featuring 131K words of main memory, six tapes, four disk drives and a batch card system.

By 1974, annual sales had climbed to $148 million and 75,000 transactions per month were being processed by 22 employees. "We were always three to four weeks behind in applying a customer's payment to his account, and accuracy was becoming a problem," McCloskey recalled.

"The off-line, batch card system just got unwieldy," he said, "and we had some plans for on-line applications to serve our customers better."

The 2050 was replaced in 1975 by a 66/40 large-scale real-time system.

The 66/40 features 256K words of main memory, five 10M-byte disk drives, seven tape drives, a front-end network processor, a communications processor, a magnetic ink character reader/-sorter, a card reader, two printers and six CRTs.

Programming and development time has been reduced by 67%, McCloskey noted in comparing the 66/40 with its predecessor. "With the 2050," he added, "80% of our systems and programming department was on maintenance and 20% on development of new programs. The Level 66 reversed those figures."

According to McCloskey, the 66/40 also enabled Puralator's DP staff to drop from a 24-hour, six-days-per-week operation to a 12-hour, five-days-a-week schedule. "And we are now doing an average of nine multiprogramming jobs per month, while we were averaging 1.2 jobs before."

The company presently has 14 CRTs, eight allocated for accounts receivable and six for credit, customer inquiries and program development.

Puralator plans to use HIS equipment to implement a "shipment control system," McCloskey said.

With a terminal in each of 35 offices, "a customer could call any Puralator office to inquire into the status of a shipment, and that office would be able to use its terminal to determine within seconds where the parcel is and when Puralator will deliver it," he explained.

"But the real value of the system is that we will be able to call the customer before he calls us," he noted.

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The Tough Ones.

1. **System Down—Processor Failure.**
2. **System Down—Disc Failure.**
3. **System Down—Repairing Hardware.**
4. **System Down—Restoring Data Base.**
5. **System Down—Software Failure.**
6. **System Down—Changing to a Larger Processor.**

Lots of things change when you go "on-line." Mostly for the better. That's why this is the most important trend in data processing today. But the one area which concerns management the most is "What happens when the computer goes down?" It's a good question, and until Tandem introduced "NonStop" processing last year the answers weren't pleasant. Service is interrupted; that's bad enough. But there is worse news still. At the instant of failure, a transaction in process could be lost (or duplicated), a record being updated could be destroyed, or a pointer changed incorrectly could cause the loss of untold records. In short, loss of service is the surface cost. Loss of data base integrity is an even greater problem. Tandem's NonStop System, hardware and software, is the first top-down, designed-in solution to both these problems. To make it even better, we've designed it so it's easy to program, easy to expand, and easily the most efficient transaction processing system around.

1. System Down—Processor Failure.
Every computer will fail sometime. The bigger they are, the more often they fail. Tandem has replaced bigness with a unique multiple processor architecture. Workloads are shared by the processors under control of Guardian, the only NonStop Multiple Processor Operating System available regardless of price class.
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2. System Down—Disc Failure.
When one of your disc storage devices fails in the middle of a file update, unknown damage to the record, to record pointers, or to indices can occur. Enscribe, Tandem's NonStop Data Base Record Manager, ensures that the damaged record is restored; and, with our optional Mirror Volume duplicate file technique, that operation is continued using the back-up file. The back-up files are created automatically and are used by Enscribe to improve system response time. When the down disc is repaired so are its files, automatically, by Enscribe. You decide which volumes to back up; Enscribe maintains them, and no interruption of service occurs.

3. System Down—Repairing Hardware.
With any system, a hardware failure must be repaired. But only with Tandem can the system keep operating, right through the failure and through the repair, too. Tandem's Customer Service Representative can remove and replace any failed module in your system without interrupting service. The operators at terminals and the programs in process are totally unaware of either the failure or the repair. And routine maintenance, too, is performed with the system fully operational. This is one more unusual feature of our system, but without it, no system can truly be called "NonStop."

4. System Down—Restoring Data Base.
When a hardware failure occurs during file update in any "on-line" system which is not NonStop, there is every reason to question the integrity of the data base. Integrity of the data base is crucial. For this reason, elaborate procedures to maintain restart points and backup files are required in almost all "on-line" systems. Not with Tandem. Using Guardian and Enscribe, the Tandem NonStop System ensures that all transactions are completed correctly even if a processor, I/O channel, disc controller or disc drive fails during that transaction. Equally important, the system downtime normally required for "restore" and "restart" operations is eliminated.

5. System Down—Software Failure.
System software crashes are an important source of downtime in ordinary on-line systems, but not in Tandem installations. Because all Tandem software is designed and tested to run in a multiple processor environment, it is also designed and tested for failure modes never considered in single processor systems software. Most important, the use of independent processors, each with its own memory, assures that a software failure in one processor cannot cause a failure in a second processor or contaminate the data or programs executing in that processor.

6. System Down—Changing to a Larger Processor.
On-line systems tend to grow, and as they grow they change. New applications, more stations, improved service; all of these result in a need for bigger, faster processors. With Tandem's NonStop System you can actually add processors, add memory, and add peripherals without any re-programming whatsoever. Using Guardian, Enscribe, and Envoy, Tandem's Data Communications method, all user programs and all files are geographically independent. They have to be for NonStop operation. You can also write your programs using a powerful high-level compiler for a multiple processor environment as easily as for a single processor.

7. System Up—Confidence Down.
When an "on-line" system is up, people come to rely on it. And because today's computers are reliable, people have come to rely on them quite heavily. Which makes it even worse when the system does go down, or the information it supplies is wrong. Confidence is severely damaged. And anyone who has tried manual back-up systems knows that they are not the answer. An automatic back-up, non-stop system is the answer. And Tandem has it.

No Failures in Five Months

Bank's DP Prospers With Independent Memory

W. ORANGE, N.J. – After adding 256K bytes of independent memory to its IBM 370/145, a bank holding company here reported no memory failures during the first five months of operation.

The Midlantic Banks, Inc. boosted the memory capacity of its Model 145 from the 512K bytes originally supplied by IBM to 768K bytes with the installation of add-on memory from Electronic Memories and Magnetics Corp. (EMM)

"We needed certain capabilities from our IBM 370/145 that we just couldn't get from our existing mainframe configuration. One of our primary considerations in expanding this memory was to minimize the effect of failed memory on our operation," according to Bob Henches, assistant vice-president and manager of technical support.

When Midlantic decided to upgrade its memory, a 50% increase in capacity was considered sufficient to meet its needs. In mid-1976, the company decided to consider independent add-on memory as the best method of achieving its objectives.

"We had three primary criteria in evaluating memory. These included the performance, flexibility and price of the memory," Henches recalled.

Narrows List

Midlantic looked at the independent suppliers of 145 memory and narrowed the list to three. Two were third-party marketing companies and the third was a memory manufacturer, EMM.

Midlantic picked EMM memory because EMM "met our objectives better than the other suppliers. Its 145 memory also offered several benefits that were especially important to our operations and heavily influenced our decision," Henches added.

These benefits included the ability to dial off failing segments of memory, plus the recording of single-bit memory hits, he said.

Also important, but not a major factor in the decision to go with EMM, was the fact that EMM's 145 memory system is static, whereas the other systems at which the firm looked were dynamic devices. The use of static memory helped to ensure the compatibility, he said.

Midlantic also recognized the installation time was very important since the center is an on-line operation and it processes savings and demand deposit transactions. It is also tied in to automatic teller machines. The EMM system was installed within 24 hours, minimizing the impact on operations, Henches said.

"During the first five months of operations, we didn't experience a fallout or any time down. After nine months we had only two hits on EMM memory, with a total deviation of three hours.

"Both EMM and Sorbus [a third-party maintenance firm] have given us excellent support when we have needed it," Henches said.

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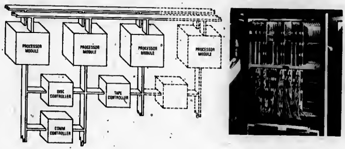
Photo and schematic show three processor modules with space for fourth module, interconnected to disc controllers, tape controllers and communications controllers.



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Key-to-Disk Keeps Collector's Data Cleaner

Special to CW

PITTSBURGH, Pa. — The NUS Corp. here has made the transition from keypunch technology to key-to-disk. As a result, it reported, its data entry error rate has dropped from 30% on keypunch to about 1.5% with key-to-disk, while handling up to 780,000 data records yearly.

NUS is involved with the design, location, construction and safe operation of nuclear power plants, fossil-fuel power generating plants, mining operations and other energy-related projects because it busies itself pulling together large masses of raw data — and converting it into understandable, useful information.

NUS' Ecological Services Division (ESD) provides scientific expertise, management support and documentation for over 200 such data collection projects annually. These projects, primarily environmental impact studies and monitoring programs, involve the collection and processing of data related to everything from hydrology and seismology to physics and microbiology.

The ESD utilizes a Mohawk Data Sciences Corp. (MDS) System 2409 key-to-disk system to help assure the required data accuracy, to keep researchers abreast of current publications in their fields and to provide a data management and entry system that is the first phase in a project sponsored by the Environmental Protection Agency (EPA) to establish effluent guidelines for the iron and steel industry.

The configuration at the ESD was implemented on Sept. 1, 1974 to replace IBM 129 keypunches. It includes a 65K System 2409 used for data entry, validation, editing and concurrent remote batch communications with IBM 370/168 and 370/158 mainframes located at an outside services vendor in Pittsburgh and a Control Data Corp. 6400 in McLean, Va.

The communications links are 4,800 bit/sec dial-ups. The system also includes five keystations; four 9-track, 800 bit/in. tape drives; a 400 card/min card reader; a teletypewriter console; and a dual disk system with a combined storage capacity of 4M bytes.

Three years ago, under the guidance of Henry Hess, manager of data analysis and biostatistical studies, a state-of-the-art enchancement of MDS' Key-to-Disk Operating System (KDOS) was created to handle the division's specialized data entry requirements. The enhanced system, called Ecological Data Validation System (Edval), allows keystation operators to enter the taxonomic classifications of biological samples with a minimum number of keystrokes and, therefore, a reduced risk of error.

Essentially, the purpose of Edval is to reduce long and complex Latin names to the shortest possible unique form and to provide operators with no special training in the sciences with a means of looking up correct phylogenetic classifications.

According to Hess, "Edval and the editing and validation capabilities of the System 2409 have reduced our data entry error rate from 30% on keypunch to only 1% or 2%. Further, we have the ability to go back and update, delete or change data stored on the disk.

"That is especially important in light of the fact that new scientific discoveries and sampling methods sometimes create the need for new or modified formats," he noted.

Scientists Up-To-Date

In 1975, Hess' staff further addressed the problem of keeping pace with new developments in the ecological sciences by creating an information retrieval system on the MDS System 2490.

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A third application, implemented in May, 1977, is the first stage in a project to gather and organize data on which EPA can base effluent guidelines for the iron and steel industry. Working with the Cyrus William Rice Division of NUS in Pittsburgh, ESD created a data entry and management system to turn on the key-to-disk system.

Responses to inch-thick questionnaires sent out to management personnel in the industry are being keyed in on the system, validated, edited and batched for data management on the 370/168 in Pittsburgh. To date, over 400 questionnaires have been received and entered, and 150,000 records have been produced. The system was also used to generate mailing labels for the questionnaires.

NUS' major reasons for implementing the System 2409 three years ago were the ability to write special applications software, to achieve the data entry accuracy and productivity rates essential to valid statistical evaluation and to communicate with a variety of mainframe and peripheral devices, Hess said.

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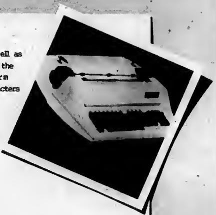

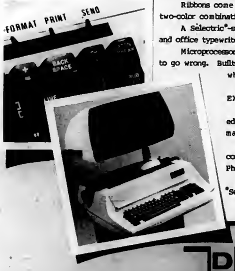

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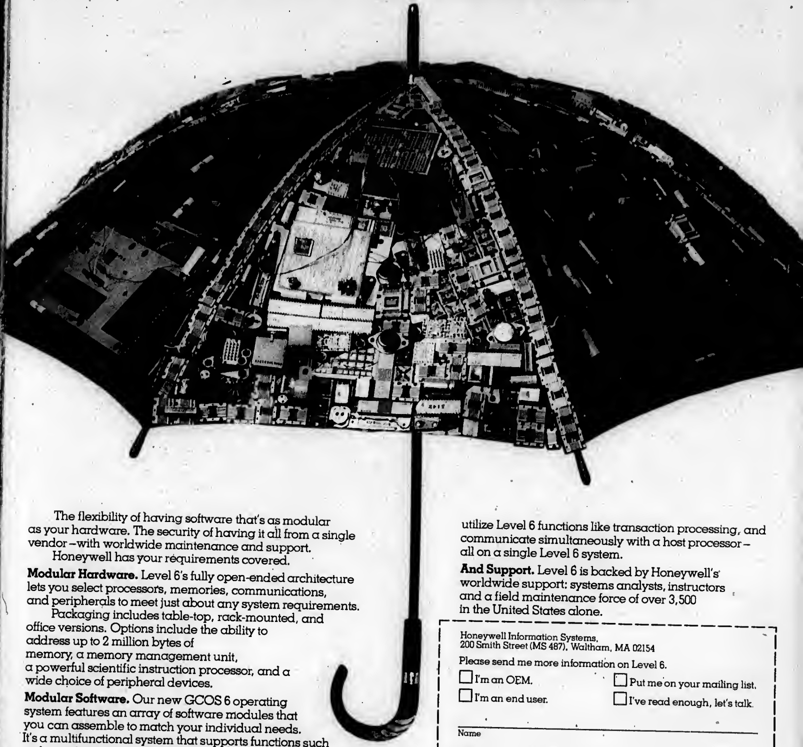

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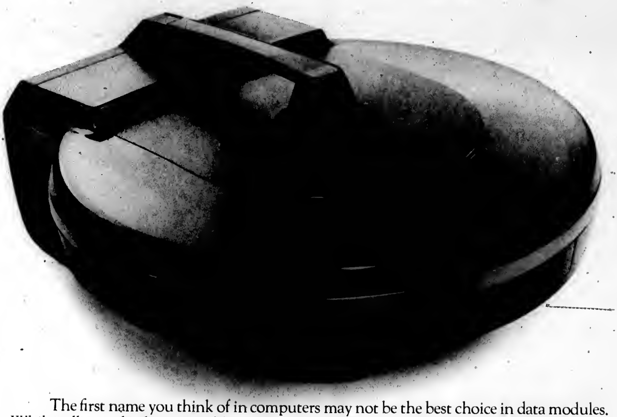

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Burroughs Unwraps Two B80 Models

By Esther Surden
CW Staff

DETROIT — Burroughs Corp. has added two models to its B80 small business system line and at the same time increased the amount of memory available on the line's original model.

The two models announced were the B80-20 and the B80-60; the original model, introduced April 1976, has become the B80-30.

All B80 models now have a minimum of 60K of memory, a spokesman noted. Memory can be expanded from the basic 60K to 124K in 16K-byte increments, he added.

The B80-20 occupies 54% less floor space than the original B80. This entry level unit can accommodate up to eight I/O channels; users can choose either a 60-or 180 char./sec built-in line printer, a free standing 160- or 250 line/min printer and up to two data communications channels for the system, Burroughs said.

Mass storage for the unit can be the firm's double-sided floppy disk subsystem, which can handle up to 4M bytes; a removable disk cartridge subsystem with a 18.4M-byte capacity; or a fixed-disk subsystem holding up to 18.8M bytes.

The B80-60 is a larger version of the B80 that can accommodate more disk storage and greater I/O than the B80-20. Users can store up to 6M bytes of data on the super minidisk, 27.6M bytes in disk cartridge subsystems and 37.6M bytes of fixed disk.

Eight I/O channels are standard on the B80-60, but these are expandable to 11 channels. Up to four data communications channels can be added to this model, the company said.

Burroughs' B80-20 system occupies less floor space than earlier models as a result of using 4K chips, according to the firm.

A basic B80-20 with 60K bytes of memory, a 60 char./sec printer, 2M bytes of floppy disk, a CRT and keyboard costs $18,510 and leases for $617/mo.

A similarly configured B80-30 with 60M bytes costs about $22,000.

The B80-60 with 37.6M bytes of fixed disk and two TD 830 workstations costs $59,400; it leases for $1,650/mo on a one year-lease, Burroughs said from its headquarters in Detroit, Mich. 48232.

DG Adds Interfaces, Software to Micronova

WESTBORO, Mass. — Data General Corp. has announced several enhancements for its Micronova systems.

Among the enhancements are I/O interfaces and software upgrades designed to make the system simpler to use in process control, commercial, instrumentation and communications applications, according to the firm.

To make the system suitable to process control and instrumentation applications, DG introduced digital I/O, digital-to-analog and analog-to-digital interface boards.

For more complex operations, the firm introduced a DG/DAC interface board that connects the Micronova I/O bus to the firm's DG/DAC Sensor I/O subsystem chassis which interfaces the system to sensors or associated electric circuits. The DG/DAC costs $2,200.

The Model 4222 digital I/O interface occupies a single Micronova board and plugs directly into the system's chassis to provide stand-alone data acquisition capability; the firm said. It costs $400.

Some peripheral controllers were also introduced. Fast I/O devices can interface to the Micronova using a direct memory access technique controlled by the 4229 High-Speed Data Channel Interface, DG said. This device, priced at $700, disables the Micronova clocks, disconnects control and data signals form the memory bus and then handles all data transfer control and memory refresh, a spokesman said. Typical throughput is 830K word/sec, DG said.

Reader Interface

A paper-tape reader interface, introduced with this announcement, controls DG 6013 400 char./sec 8-channel paper tape readers. A Nova compatible real-time clock resides on the board. An alternative model of this interface allows users to select either the interface's clock or the Micronova's clock during system generation, the firm said.

The paper-tape reader interface alone costs $400; the clock costs $350 and together on the board they cost $700.

Another interface allows the system to be linked to DG line printers. This costs $650.

(Continued on Page 57)

Mini Speeds Analyses Of Agricultural Data

By Ann Dooley
CW Staff

BELLE GLADE, Fla. — A minicomputer at the University of Florida's Agricultural Research and Education Center is saving time and money for plant and animal researchers here.

The Wang 2200 system has helped free scientists to perform critical agricultural research, according to associate professor G.J. Gascho.

But others at the center have not always agreed wholeheartedly with Gascho.

The system is not sophisticated enough and the problems caused by that are almost "insurmountable," according to Chris Richardson, former programmer at the center.

Although Richardson believed the center needed a new system, Gascho said the system is perfectly adequate for the center's work. It can't handle extremely sophisticated jobs, but that's not its purpose, he said.

The system was originally purchased for statistical analysis of research data collected by about 20 engineers and plant and animal scientists, according to Gascho.

Now, in addition, "scientists with little or no training in computer programming can develop their own specific programs with the help of the few who have some experience with programming," he said.

The center's system is three years old and includes a single cassette tape drive, a matrix printer, 12K memory, a keyboard, a Wang 2200B and Teletype communication to an Amdahl system at the Southeast Regional Data Processing Center in Gainesville.

In addition to the statistical analysis, the center also uses the

(Continued on Page 57)

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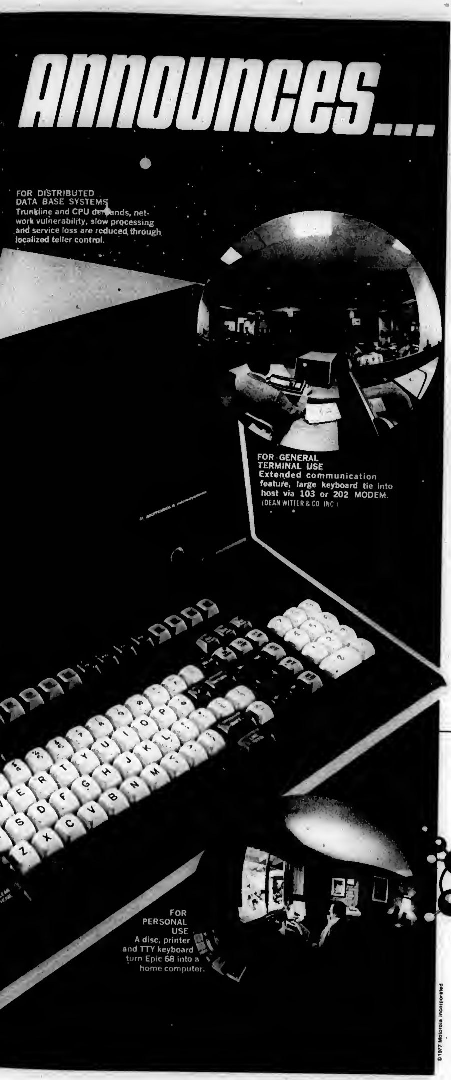
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Printer for S/3

STAMFORD, Conn. — Digital Associates Corp. (DAC) is offering a 750 line/min printer for the IBM System 3.

The heavy-duty 132-column line printer, which uses the Chaintrain printing technique, includes as standard a sound-deadening cabinet, static eliminator, paper puller, single-line memory buffer and Ebcdic 48-character lower case set and coding, DAC said.

The DAC/3-750 operates under the standard system/3 supervisor and normal I/O support routines, a spokesman said.

Tagged at $15,854, the printer is available from DAC at 1039 E. Main St., Stamford, Conn. 06902.

Turnkey Works for Insurance Agents

EVERETT, Mass. — Minicomputer Systems Technology, Inc.'s (MST) Abacus system is an in-house minicomputer system for insurance agents and brokers.

The system allows the cost-effective management of an agency and also provides sales information to help market agency products, the vendor claimed.

The system contains several independent modules including premium billing and policy maintenance; accounts receivable; company accounting and reconciliation; broker and producer accounting; accounts payable; general ledger; and management reports.

Self-Instruct Manner

Abacus includes more than 140 programs and is written in a tutorial, self-instruct manner that allows the nontechnical user to pick the job or function to be done from lists displayed on the CRT screen, MST said.

This conversational operating mode allows the system to be run in a programmerless environment, a spokesman added.

Provides Billing

Since the disk files in the system hold a data base of customer and policy information for a 12-month period, Abacus provides billing, renewals and expirations based on historical policy data.

Abacus is installed as a turnkey system with 32K bytes of memory and one to 32 CRT screens. Disk size ranges from 500K bytes to 88M bytes. The system will support one or more printers.

A single-user system costs $27,900 or leases for $625/mo.

MST is at 137 Ferry St., Everett, Mass. 02149.

Add-On Offered For DG Memory

SANTA ANA, Calif. — Standard Memories/Trendata has introduced an add-on core memory designed for the Data General Corp. Nova 3/4 and 3/12 minicomputers.

The Pincomm N3 is a plug-in mainframe memory system with storage capacity of 16K words by 16 bits. Up to eight of the Pincomm N3 modules can be configured to give the Nova 3/12 a maximum capacity of 128K words, the vendor said.

Memory access and full cycle times are 350 nsec and 1 microsec maximum, a spokesman said. Pincomm N3 has three operating modes: read/restore; clear/write; and read/modify/write.

The memory has been field-tested and "proven to meet or exceed the operating parameters required when inserted in any memory allocated connector position in all CPU models," the vendor claimed.

The Pincomm N3 costs $1,808.

Standard Memories/Trendata is at 3400 W. Segerstrom Ave., Santa Ana, Calif., 92404.

Lexidata Adds Soft Mini Plotter

BURLINGTON, Mass.— A full refresh, raster scan video soft plotter that reportedly fits any minicomputer and runs on standard hard-copy plotter software is available from Lexidata Corp. here.

The Lexidata Universal Soft Plotter is self-contained on a single printed circuit board and can be connected to any minicomputer via that system's standard hard-copy plotter interface, a spokesman said. Any standard hard-copy plotter applications and driver software will run the soft plotter at speeds in excess of 6,000 point/sec.

This speed makes the Universal Soft Plotter suitable for previewing slow, complicated plots, or for running many different plots, the company added.

For resolution of 256 by 256, the unit costs $1,900; for resolution of 512 by 512 it costs $2,900. A black-and-white viewing monitor costs an additional $250. Lexidata Corp. is at 215 Middlesex Tnpke., Burlington, Mass. 01803.

Printcraft Guide Lists Compatible Media

NEW YORK — Printcraft Systems, Inc. has published a four-page cross-referenced guide of compatible magnetic media supplies used with minicomputers and word processing systems.

The reference lists compatible diskettes, cassettes, magnetic cards and tapes, data cartridges and disk packs for any system manufactured, a spokesman said.

Printcraft is at 11-17 Beach St. N.Y., N.Y. 10013.

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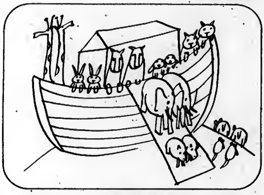

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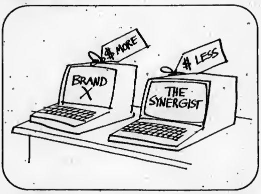

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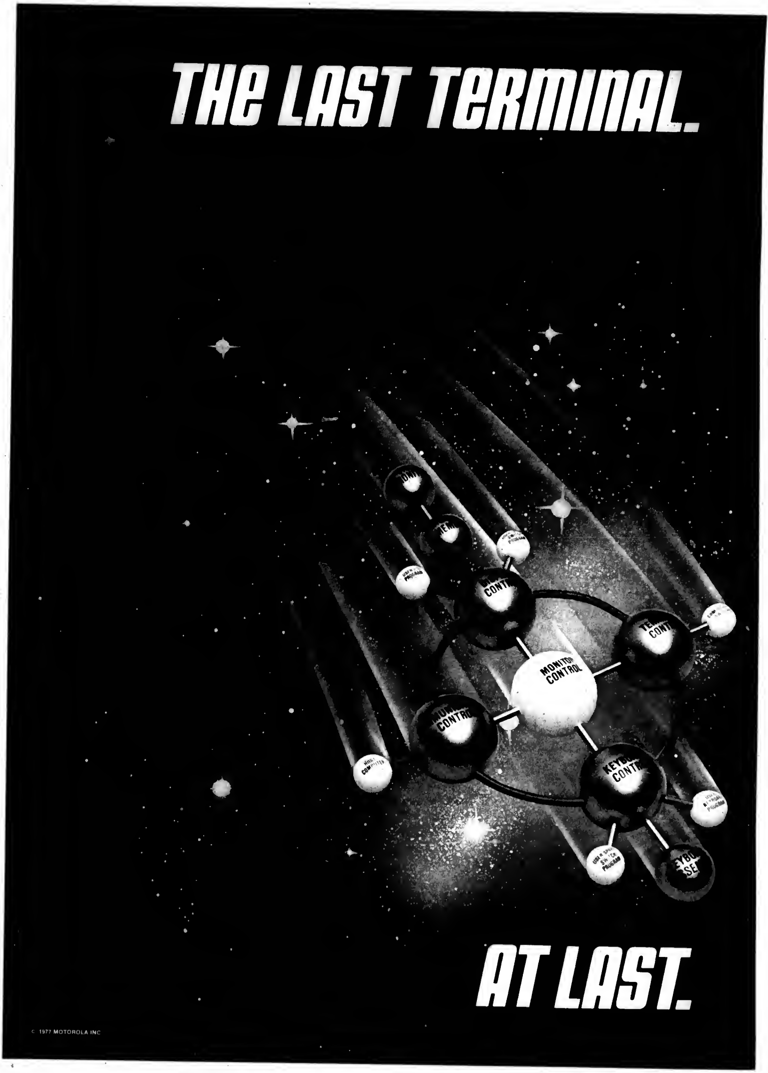
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For Daily Doughnut Deliveries

Baker's System Freshens Billing, Distribution

TAMPA, Fla. — A small business system at a Krispy Kreme Doughnut Co. franchise here has helped the firm take a fresh approach to its routing, distribution and billing applications.

The company, a wholesale/-retail producer of doughnuts with its wholesale operations representing 70% of the business, sells to thousands of customers ranging from large supermarket chains to small "mom and pop" stores.

Since the firm offers a "guaranteed sale," careful control of distribution is important; any unsold day-old doughnut is returned for full credit, according to Robert L. McCoy, executive vice-president of the franchise. "Wholesaling of a fresh dough product on a daily basis makes us unique. If it isn't sold, our delivery man picks it up and replaces it with a fresh product".

The system has made a significant difference to the business, he said. "Everything about our business changed" after the firm switched from a manual system to a computer-controlled environment.

"The route salesmen needed the most adjustment. They were each doing their own thing. For example, they knew what was sold and to whom. We didn't. We didn't even know how many accounts we had! Cash accounts were handled in an unprofessional manner when it came to documentation. Also, we provided trucks and gas but didn't know if they were traveling 15 miles to sell a dozen doughnuts.

"Now we know every customer and where— every doughnut goes. And we know how many returns we get," he said. "Having the knowledge to eliminate the accounts that were not profitable and sell more to those who were selling out every day helped justify the use of the system," McCoy added.

Full-Shelf Stategy

Marketing information also indicated that full shelves sell more doughnuts, because no one likes to take the last package for fear they are stale. Therefore, a certain amount of returns are built into delivery to increase total marketing gross, he explained.

Although the company was aware of the "full shelves" technique, before installing the system it had no way of determining how many doughnuts to place in a particular selling situation for a maxiumum advantage with a minimum of returns, he noted.

A weekly printout now itemizes the sales of each route salesman, detailing the store and the amount returned.

McCoy had had exposure to DP techniques in college. He suggested to his father, B.L. McCoy Jr., president of the company that computer programming and techniques might increase billing capability and provide feedback while giving a marketing forecast — all impractical under the hand-tabulated employee acounting system.

"At first I thought the computer's advantages were a little fanciful, but I was willing to let the computer people and Bob show me if it would be practical," his father said.

The McCoys' first exposure to a computer salesman was somewhat disturbing. After they had defined their problems, the initial reaction of the representative was to offer a unit that solved the immediate problem, then sell additional services that would require a move to a larger system. This usually resulted in a final proposal that "blew our mind."

A Cincinnati Milacron distributer contacted the firm and proposed a system based on a CIP 2200. The system was capable of solving the company's immediate problems, as well as coping with additional applications later.

Before choosing the system, the doughnut makers looked at several manufacturers' minis including Digital Equipment Corp., NCR, Honeywell Information Systems, Qantel Corp. and IBM.

Tailored Program

Bob's father commented on the ability of the representative to tailor a program to their needs. "Anyone who buys a new computer accepts that there will be problems. The representative lived up to every commitment and seemed as interested in our business as we were."

The younger McCoy commented. "Sure, at first we had some software problems. But I could see the distributor on Sunday night at 3 a.m., if I needed to, in those first days. Its cooperation was outstanding."

The software configuration allows operation in accounts receivable, billing and route sales analysis. All of the production (for example, standing orders) can be coded to the day. "We know how many doughnuts to make for every shift at both plants. The system also automatically prints invoices for every account on a daily basis. The invoice goes out with the doughnuts, is signed, returned, and fed back into the computer to update accounts receivable and provide a sales analysis," the younger McCoy explained.

Billing used to be a nightmare before the system was implemented. Variables included weekly, biweekly, monthly and special arrangement accounts (cash customers and charge customers). "With the volume of accounts and the variety of account procedures it became quite a chore, almost impossible," he said.

Salesmen Handle Receivables

Also, the route salesmen were responsible for cash sales. The system made it possible for the salesmen/route delivery men to handle receivables. Now management receives cash invoices and gets a sales analysis on short notice.

Sales information fed into the system gives a breakdown on what each particular store is selling. This allows the McCoys to "forecast in regard to product and what kind of returns we'll be getting. The computer has enabled us to increase the capacity to handle invoices (about 1,000 per day). Quite frequently, it was difficult to get our statements out on time and we needed extra manpower. On many occasions we ran late."

DG Eclipse Unlimited Memory?

Not exactly, but the M-5 Virtual Memory System provides an effective program execution space of more than 2 Megabytes for the FORTRAN 5 user. M-5 runs on your existing DG hardware and requires no special programming. Eliminate your 64 KB constraints instantly.

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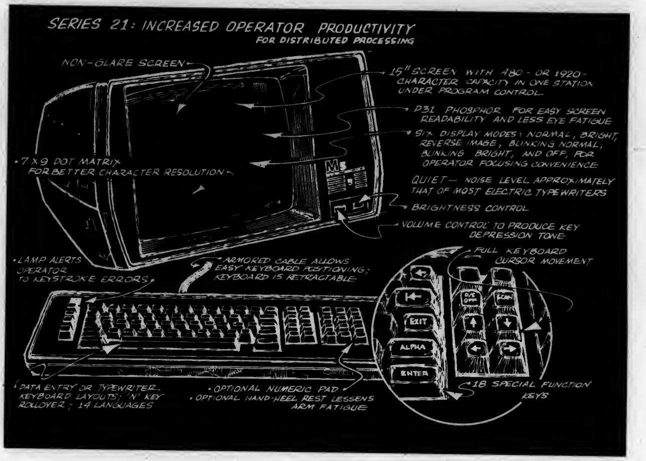
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Besides 60% Sales Boost

Mini Gives Insurance Agents More Confidence

By a CW Staff Writer

LOS ANGELES — Faced with only moderate sales and an inexperienced staff, an insurance agency here managed to boost sales 60% in five years from $11 million to $17 million with help from a minicomputer system.

When Charles Vance became head of one of Pacific Mutual's Los Angeles agencies, seven of his top agents were planning to retire or leave the company. New agents would need extensive training as well as years of experience before they could produce at top level.

In order to keep sales from dropping any lower, Vance began a study to determine how to maintain and increase the agency's sales. He found his answer, he said, with a Wang Laboratories, Inc. WCS-20 system and Wang's Lifeline software, which is used as an in-house policy illustration and letter-writing system.

Quick Illustrations

Computerized policy illustrations are one of an insurance company's most effective tools, according to Vance. Before the Wang system was implemented, however, younger agents were reluctant to use them; time-sharing companies charged up to $8 for each illustration and the agents couldn't afford them, Vance explained.

In addition, the time-sharing services didn't allow any flexibility in designing and modifying the illustrations at a reasonable price, Vance said.

In order to find a substitute for time-sharing, Vance and Craig Freeman of Software Systems, Inc., a member of Wang's National Software Vendor Network, developed what has evolved into Lifeline.

With a few input variables such as policy values, age of prospect, dividend and rider options, Vance and his agents can now produce within minutes any illustration necessary for an effective sales call, he said.

The system provides policy illustrations for ledger statements, three-term insurance schedules, flip-flop proposals and schedules for flexible deposit and split-dollar policies.

The system also automatically compares various policies, including those of competitive carriers, in terms of value, premium outlay and investment return.

The capability of producing limitless illustrations without a charge for each one has encouraged Vance's agents to prepare a variety of proposals to find the best alternative for each customer, he noted.

The system has given new agents confidence in dealing in a sophisticated marketplace and has provided the more experienced agents with increased time to devote to selling instead of working out the complicated proposals, Vance said.

Letter-Writing Program

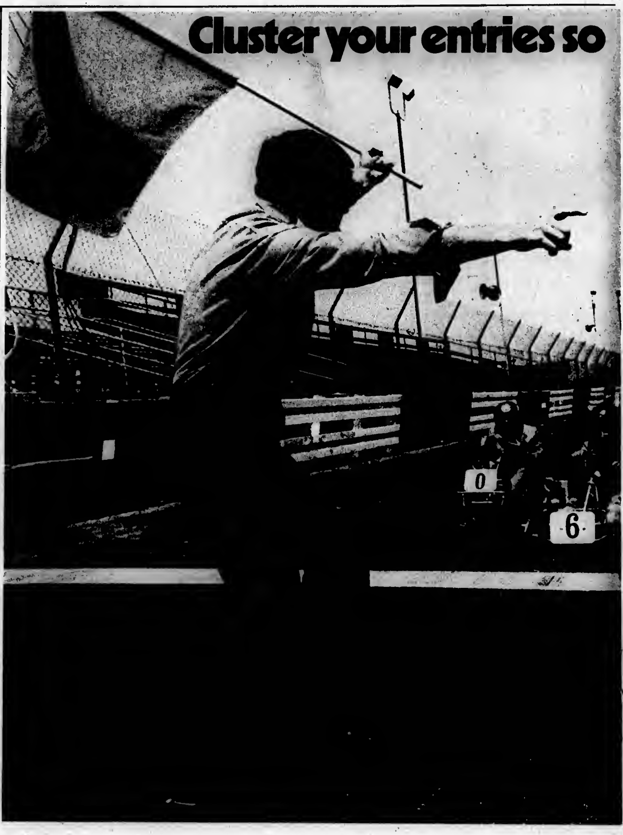
"In five or 10 minutes, we can do what it would take a person five or 10 days to do with a calculator and a pencil," he added.

In addition to the illustrations, the system features a letter-writing, editing and mailing list management program that is used to generate new sales leads, stimulate sales from current policyholders and even recruit new agents, according to Vance.

The interactive Lifeline couples an automatic user-maintained client file with custom-designed letters and memos, stored on floppy diskettes, to deliver personalized mailings, Vance said.

Lifeline extracts names from the file based on any parameters the user selects then automatically inserts the selected information into a prewritten letter.

The Pacific Mutual agency uses Lifeline on Wang's Model 2281W daisy wheel high-speed printer. Vance originally installed a cassette-based Wang system, but later upgraded to a WCS-20 with 16K CPU and Model 2270-2 floppy diskette for faster response time.



Mini Helps Researchers Sort Agricultural Data

(Continued from Page 49)

computer system for simulating and calculating celery growth models.

The center uses Statistical Analysis System (SAS) software from SAS Institute, Inc. for sugar cane growth and nutrient analysis, Gascho said.

Soil Evaluation

In addition, the system is used for making yearly fertilizer recommendations for sugar cane growers in the surrounding area.

Using the computer, a technician can type the grower, lab, field identification and soil test values directly on the system keyboard. The data can then be typed and appropriate copies made for the grower, the extension agent, the fertilizer dealer and for the center's file. The extension agent can then check for any abnormalities in the soil in a much shorter length of time and with less errors than through using the previous manual method, Gascho stated.

Payroll for the center's employees is also handled on the system, he added.

Some of the data and more complicated statistical procedures require more memory than the Wang system has. For this data, the system can be used to access the Gainesville computer, Gascho said. "Prior to our having this capability, one to six months were often required for obtaining statistical results. With the present system, these results are obtainable in one day," he said.

So the system actually provides in-house processing with extended capabilities obtained through time-sharing, he said.

Wang's service to the center has been good, especially considering that it is 50 miles away from the nearest local service, Gascho said.

Purchase of System

The system was purchased over time because the $20,000 purchase price was too high for any one year's budget, Gascho said. The first upgrade included CRT, keyboard and memory enhancement. A high-speed printer and terminal accessories have also been purchased over the least three years, he said.

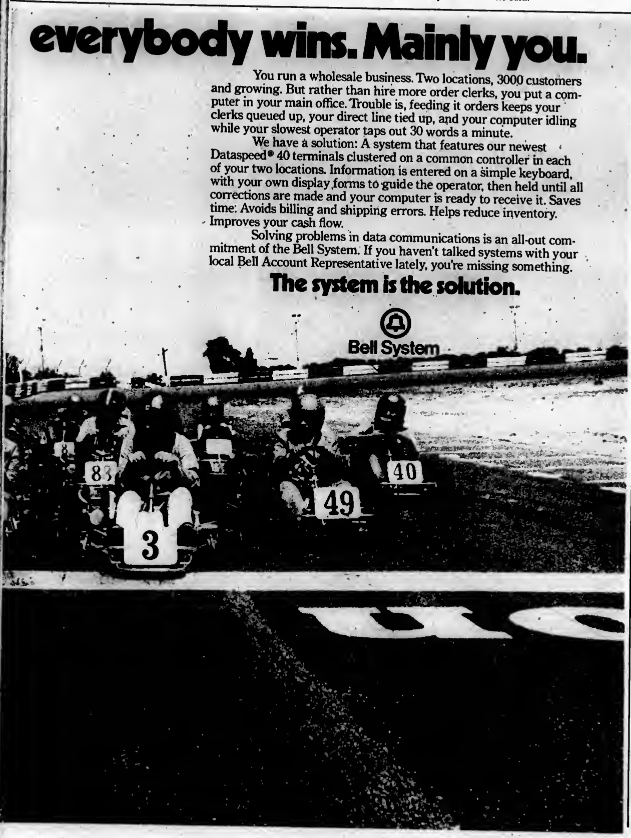
Although the demands put on the system have increased, Gascho feels it is better to upgrade than buy a completely new system.

DG Updates Micronova

(Continued from Page 49)

A paper-tape software package was also introduced. The software includes an editor, assembler, debugger and Basic, each designed to operate in 4K of memory, the company reported. The first-time license fee for this package is $125.

In addition, a programmable read-only memory burner utility program was announced. This free package operates under DOS and RTOS. DG is at Rt. 9, Westboro, Mass. 01581.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Monitor System Keeps Things Rolling at Mill

PROVO, Utah — A minicomputer-based automatic maintenance monitoring system is helping prevent unscheduled downtime and reduce scrap loses at a Geneva Works of U.S. Steel mill here.

The monitoring system is also used to help prevent breakdowns in the water recycling system and to distribute the plant's natural gas allocation over its 24-hour period, a spokesman said.

Geneva Works is a fully integrated steel mill in which iron ore, coal, limestone and scrap are processed through various stages into semi-finished and finished products.

Before mini-based monitoring, rolling mill bearing temperatures, oil flow rates and oil pressures were checked visually by operators in the mill.

The method was costly and it was not foolproof in preventing unscheduled maintenance. Operators could make errors, and the more points any operator watched, the less likely he was to catch a problem before it caused an unscheduled shutdown.

More than four years ago, it was suggested that automated maintenance monitoring could save the plant money by spotting problems before they developed.

If the system could, for instance, spot a temperature rising in a bearing, it might be possible to "coax" the bearing to continue working until a scheduled maintenance period. Or at least it would be possible to clear the mill so that the product in process would not have to be scrapped.

The system selected was the Hewlett-Packard Co. 9600 with Real-Time Executive II operating system and an HP 7901 disk drive.

The system takes care of the real-time task of maintenance monitoring, as well as on-line program development, program testing and editing, disk storage of programs and data and program linking. The program language adopted was Fortran.

The system currently monitors the temperatures of 42 bearings ranging in diameter from 4- to 14 in. in the motor room of the slab rolling mill. It also monitors oil flow rates and oil pressures to those bearings. Most of the tasks are confined to a motor room 300 feet long by 80 feet wide.

The system is programmed to scan each bearing temperature once every minute. If a temperature reaches 178° F, the mini sounds an audible alarm in the Load Dispatch Center and simultaneously prints the number of the problem bearing, its temperature and the time of scan on a CRT terminal in the center.

The load dispatcher then calls a maintenance operator by telephone and instructs him on what action to take.

The load dispatcher can request a scan of the bearing as often as he wishes and can get a hard-copy printout by bearing, number and time from the computer.

August Develops Data Handler For Desktop CPU

ORANGE, Calif. — August Technology Corp. has an intelligent data handling and recording device designed for use with Hewlett-Packard Co., Wang Laboratories, Inc. and IBM desk top systems.

The 7701 provides multiple I/O channels, data manipulation capabilities and storage of up to 580K bytes per cassette; it includes an 8080-type microcomputer and up to 64K words of memory, according to a spokesman.

The unit contains up to 10 teletypewriter current-loop, synchronous or asynchronous RS-232 ports and an 8-bit parallel data bus, the spokesman said.

Data can be recorded and played back on a Philips-type cassette through any port on the bus at the same or different rates, and data can be transferred among ports and the bus without recording, the company claimed.

The basic system with 2K of random-access memory and a 1K buffer costs $3,250. Prices range to $5,000 depending on the number of ports, interface, amount of memory and options, the spokesman noted from the firm at 2040 N. Maplewood St., Orange, Calif. 92665.

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Has Job Many Would Envy

DP Manager Amasses Treasure Trove

By **Jeffry Beeler**
CW Staff

LOS ANGELES — Many die-hard microcomputing enthusiasts would probably like to trade places with William C. Hoffer. Like the proverbial child turned loose in a candy store, Hoffer, who serves as DP manager for one of the organizations in a large aerospace firm, roams the hobby computer market almost at will and samples its vast and varied delights at every opportunity.

If a particular piece of hardware strikes his fancy, as often happens, he nonchalantly buys it with company funds and takes it back to his home or office, where he experiments with the new acquisition at his leisure.

As a result of his sampling and impulse buying, Hoffer has amassed a small fortune in microcomputing hardware. His collection at work alone includes a 48K-byte Imsai 8080 microprocessor unit (MPU) with an 8K programmable read-only memory, an Imsai FDC 2-2 dual floppy disk unit, a Digital Equipment Corp. LA36 Decwriter terminal and a small trove of boards, including a Technical Design Labs (TDL) MPU built around a Zilog Z-80 microprocessor, Industrial Micro Systems and TDL memory boards, D.C. Hayes 103 modem boards, Compu/Time date and time boards, Imsai 2-2 serial input/output boards, and TDL monitoring boards.

What's more, the DP manager has assembled an almost identical hardware array at his home.

Evaluation the Impetus

Hoffer's yen for hardware collecting, however, is prompted by more than just a "pack rat" instinct or the hobbyist's love of tinkering. His main reason for assembling such a large assortment of microcomputer equipment is to evaluate each new hobby computer offering as it enters the market and determine to what extent these products could blend into his company's existing engineering environment.

Hoffer's firm, which designs and builds guided missiles for the U.S. Department of Defense, currently uses an "awe-striking" array of computer systems for its engineering applications, he said. These systems include an Amdahl Corp. 470, "many" IBM 370/168s and Hewlett-Packard Co. 3000s, Decsystem-10s and a variety of other IBM mainframes.

The company also farms out some of its design work to various service bureaus, he added.

After a year of experimenting with and evaluating various microcomputer systems, Hoffer has concluded that some of the equipment he has collected could well find a place in his company's guided missile design projects, especially in routine "number-crunching" applications.

In fact, he will eventually submit four of his microcomputer systems to the company's missile designers for consideration as possible engineering tools. Hoffer hopes to make his equipment selections by the first quarter of next year.

Potential Cost Savings

The chief benefit of using microcomputer systems to aid design work lies in their potential cost savings, the DP manager explained. Hoffer bought his office system a year ago for only about $5,000 to $6,000; the equipment costs almost nothing to operate, he said.

With the large computer systems and the service bureaus, in contrast, Hoffer's company "spends many times that amount each month" just for service charges and other operating expenses, he said.

The benefits of having a home microcomputer system, on the other hand, have been more difficult to identify. Hoffer admitted that in the year or so since he acquired the personal computer system, he has found "very few" applications for the equipment.

"I have aspirations of doing all those wonderful applications that magazine articles say you can do with a microcomputer system," he confessed. To date, however, lack of adequate software has prevented him from achieving most of his applications goals for the home system, he noted.

Both the home and office systems accommodate programs written in Assembly language, two versions of Fortran and three versions of Basic. Hoffer uses the Assembly language programs to drive his peripherals and the remaining programs for all other functions.

The office system runs under a Digital Research Corp. CP/M operating system; the home system, under a TDL Zapple operating system.

For the most part, Hoffer is satisfied with the performance of both systems. "On a scale of one to 10, I'd rate the systems at least a nine," he said.

Although hardware documentation has proven poor, software documentation usually has been good and at times "outstanding," he stated.

The only serious problem Hoffer encountered occurred shoftly after he installed the systems, when he "plugged the equipment in and nothing happened," he recalled. The office system took about six weeks to "debug" and make fully operational and the home system took about a week, he added.

Professionalism Still to Come

Hoffer attributed his early problems with the two systems to lack of adequate hardware testing by hobby system retailers and to a paucity of professionalism in the microcomputer industry as a whole. "It will be another couple of years at least before the industry matures to the point where it's fully professional," he believes.

At present, he said, the industry is populated largely by "entrepreneurs who know a great deal about hardware, very little about software and almost nothing about business."

To achieve the professionalism it needs, the microcomputer industry must, among other things, adopt strict interfacing and other hardware standards similar to those that have prevailed in the large systems sector of the computer industry for years, Hoffer advised.

Micro Becomes Teaching Tool In Auditors' Basic DP Course

By Tim Scannell
CW Staff

CINCINNATI — A supervisory mathematician here supplements a training program in basic DP for auditors with an Imsai 8080 microcomputer, which he uses to provide both graphic instruction and "hands-on" experience.

Arthur Foreman, an employee of the U.S. General Accounting Office (GAO), uses the microcomputer, assembled from a kit, to show his pupils the basic simplicity of a computer's operations, he said.

The MPU that is currently installed uses machine language and contains 4K of read-only memory (ROM).

Foreman decided to use the 8080 for his teaching because it proved to be more practical than using a large mainframe with a class that knew relatively nothing about DP, he said. "I try to show the other auditors what a computer is, what it does ... and go from there so that they understand some of the basic controls involved." Using the Imsai, "I can demonstrate how primitive a computer is, which is something you can't do with a large system," he explained.

Homework First

He decided upon the Imsai 8080 after reading about the various models and system in trade magazines and newsletters and comparing their specifications with his needs. He also consulted a friend who had an Altair microcomputer, which he had assembled.

After comparing the Imsai circuitry with that of his friend's computer, he decided to purchase the 8080. "I got the circuit diagrams, and certain things just didn't look as good as the Imsai. Imsai [at that time] was using standard chips [Intel], whereas the first Altairs weren't," he said.

Foreman purchased the Imsai from a firm called Cheap, Inc. "... because the name sounded great" and because they were offering a 20% discount.

"Building the kit was more or less like doing needlepoint," Foreman explained. "There was the mother board that contained 22 slots and 100 wires, which is 2,200 soldering connections. So you don't learn too much about electronics but you do learn a great deal about soldering." Total time spent assembling the kit was approximately eight weekends, he added.

The only problem he had with the computer was the discovery of a bad chip when he had finished the assembly. Although he could pinpoint where it was, he felt he wasn't technically capable of debugging the MPU, so he had to send the unit back to Imsai for repairs.

Month to Repair

"It struck me that microcomputers just weren't for the commercial world. Even though [Imsai] was nice about it, it took a month to six weeks to repair the unit. That would have been disastrous if I were really depending on it."

Foreman is currently experimenting with building an interface board for the microcomputer and hopes to connect it to a series of lights, bells and buzzers to further demonstrate its capabilities to his students. He also eventually hopes to purchase a used Teletype or CRT monitor to further supplement the Imsai system.

Although Foreman is associated with the auditing department of the GAO, he doesn't use the microcomputer in any of his auditing duties. The department uses an IBM 360/168 in all of its auditing functions, he said.

The 8080 is used for approximately two hours a week in the training classes at the GAO. "It is my hope that other people in the office have been given some sort of feeling about what goes on in a computer. Rather than saving time [in the classroom], it promotes a deeper understanding of what a computer does," Foreman said.

LEARNER'S LEXICON

C

CCD (CHARGE-COUPLED DEVICE) — Image sensors known as CCD are nickel-sized or smaller silicon chips, some containing over 120,000 electronic elements. When an image is focused on the CCD, the sensor's electronic elements transform the picture into individual electric charge packets. These packets are then read out very rapidly by charge transfer techniques. The resulting information then can be processed and displayed as a TV picture. In the CCD, half the electronic elements form the imaging array and the other half are for storage and readout.

CELL — 1. The storage for one unit of information, usually one character or one word. 2. A location specified by whole or part of the address and possessed of the faculty of store. Specific terms such as column, field, location and block are preferable when appropriate.

CHANNEL — 1. That portion of a computer's storage medium which is also accessible to a given reading station. 2. That part of a communication system that connects the message source with the message sink. In the information theory in the sense of shannon the channel can be characterized by the set of conditional probabilities of occurrence of all the messages possible received at the message sink when a given message emanates from the message source. 3. A path along which signals can be sent, e.g., a data channel, output channel. 4. The portion of a storage medium that is accessible to a given reading or writing station, e.g., track, band. 5. In communication, a means of transmission. Several channels may share common equipment. For example, in frequency mulitplexing carrier systems, each channel uses a particular frequency band that is reserved for it.

CHARACTER — One of a set of elements which may be arranged in ordered groups to express information. Each character has two forms: 1. a man-intelligible form, the graphic, including the decimal digits 0-9, and letters A-Z, punctuation marks and other formatting and control symbols; and 2. its computer-intelligible form, the code, consisting of a group of binary bits.

CENTRAL PROCESSING UNIT (CPU) — 1. A unit of a computer that includes the circuits controlling the interpretation and execution of instructions. Synonymous with mainframe. Abbreviated CPU. 2. The central processor of a computer system contains main storage, arithmetic unit, control registers and scratchpad memory.

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Manufacturers' Ideas Guard Against Static

Special to Computerworld

Minicomputers, microcomputers, hand-held calculators and many terminals would not be possible without MOS microcircuits. These bita of silicon perform the functions of entire assemblies, but cost much less. Every technological advancement, however, has a price in terms of requiring changes in procedures and equipment. The price for obtaining the advantages of microcircuits is that they are sensitive to a common phenomenon — static electricity.

Anyone handling an MOS device or a subassembly containing one must learn a whole new set of rules.

Static electricity can be generated by many sourcea — carpets, clothing, motors and friction. Static electricity can even occur when any two materials make contact.

Some combinations of materials generate considerable more static electricity than others. There is a transfer of electrons, with one material coming away with negative charges and the other with poaitive charges.

Static electricity is dissipated, and a spark can even occur when this phenomenon (known as the triboelectric effect) takes place.

Therefore, if a microcircuit ia placed on a surface of another material — a plastic shipping box, for example — it would be a party to creating its own source of harmful static electricity.

The most threatening source of static electricity, however, is any person who contacts it. An electrostatic charge of less than 100 volts can "blow out" the thin layer of glasa that insulates the microcircuit gate from the substrate. A human body can generate as many as 50,000 volts.

MOS devices manufacturers through the years have developed techniques and equipment for protecting MOS devices while they are being produced and shipped. This technology is passed along to companies that install the microcircuit devices in their computer products. Printed instructions accompany the microcircuit shipment.

If damage persists, a quality control engineer may visit the plant to recommend changes in the way the microcircuits are handled. Unfortunately, this data is not passed on to the hobbyist who is assembling his own computer system.

While microcircuit manufacturers have differing procedures for protection against electrostatic damage during production, they generally agree on fundamental techniques, materials and equipment recommended for anyone who later must handle microcircuit devices. The procedures are easy to follow.

Makera' Recommendations

Some guidance can be gained by looking at a basic conductive "workstation" that contains the basic items recommended by manufacturers for use in handling microcircuits. These are:

- A conductive plastic wrist strap having a Velcro fastener to hold snugly but comfortably around the wrist and a clip on the other end to attach to a ground. This drains static electricity at the closest point to the work that is possible without interference with finger movement.
- A conductive plastic workbench cover to spread out before putting the microcircuit product down. A microcircuit should never be placed on a nonconductive surface.
- A conductive plastic grounding strap with a clip on both ends. In use, the wrist strap usually is fastened to the conductive workbench cover which is, in turn, grounded by the grounding strap. No microcircuit device or assembly should be handled until the wrist strap is attached at both ends.

For use in handling small assemblies, there is a workstation containing a benchtop cover of conductive felt instead of plastic. The softer material protects polished surfaces from damage and can be folded to put away when not in use.

Conductive rubber floor mats are common in microcircuit plants, but are not among the precautions recommended for the hobbyist because of cost.

In certain parts of the country, or at certain times of the year, added precautions might be necessary because static electricity builds to higher levels when the air is dry. Other devices for preventing the user from "blowing out" microcircuits include seat covers and shoe covers.

Some precautions are recommended by microcircuit manufacturers even when conductive plastic antistatic products are employed. Those that appear most often on manufacturers' instructions to users are:

- Never touch the pin of an MOS device or the "chip" itself.
- Wear a cotton smock or other outer garment. (Synthetic materials are excellent producers of static charges.)
- If handling a newly purchased microcircuit, leave the device in the protective container until it is ready to be installed. Individual microcircuits are usually shipped in a padding of conductive foam plastic. The pins are inserted into the foam to hold the devices in place while giving maximum conductivity.
- Ground tweezers or other hand tools that come into contact with the device.
- Keep candy wrappers, cigarettes or other foreign objects away from the work area.
- No power should be applied for testing or any other purpose until all leads of the microcircuit are attached.
- Do not have a carpet on the floor. If it cannot be removed, cover it with a conductive material.

The MOS failures that the hobbyist should be most concerned about are not the catastrophic failures that occur during handling, but the permanent shifts in parameters that cause failures long after assembly. These are not easily detected during assembly and go unnoticed.

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CI Notes

Logical Machines Takes Byte, Inc.

SUNNYVALE, Calif. — The Logical Machine Corp. has acquired Byte, Inc., a retail store chain that specializes in microprocessing equipment and computer-related literature.

Comprised of nearly 60 dealerships throughout the country, Byte, although wholly owned by Logical, will remain an independent subsidiary, a spokesman said.

Byte agreed to the purchase in the hopes that Logical will provide the guidance and financial backing necessary for future expansion, Jerry Brandt, Byte president said.

Byte is currently composed of two primary divisions, distribution and manufacturing. The distribution division supplies the dealers with periodicals, manuals, microprocessors and other computing equipment.

The manufacturing division produces a microprocessor that is sold as an integrated system through the various dealerships.

Britannica to Honor HP Board Chairman

CHICAGO — David Packard, chairman of the board of Hewlett-Packard Co. and former Deputy Secretary of Defense, is one of the nine men and women who will be honored this month with a 1978 Encyclopaedia Britannica Award for Achievement in Life at a dinner here.

Packard will receive his award for achievement in business.

The selection of the Britannica award winners was made on the basis of contributions to society in the areas of government, business, science, the arts and education; significant personal achievement — the setting and accomplishing of meaningful goals in their own lives; and dedication to knowledge and human enlightenment.

An early interest in science and engineering led David Packard to help found HP in 1939. He received his bachelor's degree in electrical engineering from Stanford University and has been honored with doctorates from five universities. Between 1969 and 1971, Packard served as Deputy Secretary of Defense.

Coleman SIA Head Again

SAN FRANCISCO — Bruce T. Coleman, president of Boole & Babbage, Inc., was reelected president of the Software Industry Association (SIA) and elected to the board of directors of the Association of Data Processing Service Organizations (Adapso) at the recent Adapso meeting here.

SIA, the software section of Adapso, promotes "the integrity of the software products and services industry for the business community and general public," the society said.

Asks Supreme Court Review

IBM Takes Greyhound to Top

By Molly Upton
CW Staff

WASHINGTON, D.C. — IBM has petitioned the Supreme Court to review the appeals court decision that ordered a new trial in the antitrust case filed against it by Greyhound Computer Corp.

The U.S. Court of Appeals for the Ninth Circuit recently ordered a new trial for the case [CW, Aug. 29] that had been dismissed with a directed verdict — for insufficient evidence — by a district court in 1972.

The appeals court ruled that the case should go to a jury and that Greyhound had established a case by "showing IBM employed exclusionary tactics to maintain an existing monopoly in the lease market."

IBM's brief to the Supreme Court focused on the portion of the appeals court decision that stated "the jury could have concluded that IBM maintained its monopoly power in the leasing of general-purpose computers in part by practices that unnecessarily, even deliberately, excluded leasing companies from an opportunity to compete."

The appeals court judgment should be reversed because it "intimidates vigorous competition on the merits," burdens lower federal courts and harms defendants, including IBM, the IBM brief stated.

"Surely the effect of such a decision is to spawn litigation by those unsuccessful in the competitive marketplace; to impel successful companies to 'soften' their competitive activities so as to avoid the expense and penalties of such litigation; and hence to suppress that 'free and unfettered competition' which the Sherman Act was enacted to protect and encourage," IBM stated.

Honest But 'Unnecessary'

IBM challenged the opinion that lawful, honest business acts that might "exclude unnecessarily" competitors were in violation of the antitrust statute.

IBM labeled as a "self-evident erroneous position" the court's stance that "normal competitive acts were unlawful if 'unnecessary' even if taken outside of the market in which the power supposedly exists and in the market in which no power is possessed or was even claimed."

IBM's brief dealt with a number of principles enunciated by the appeals court, including:

- Whether a jury could find any firm could monopolize a submarket such as leasing, distinct from a submarket of purchasing.
- Whether a jury could find IBM possessed monopoly power in the lease submarket almost entirely because IBM had a large share of that submarket, despite factors that would tend to disprove classical definitions of monopoly.

IBM asked whether the appeals court erred in holding that a jury "could find that IBM was liable for an attempt to monopolize where it was assumed that 'the record would not support a jury finding of even a dangerous probability of monopolization' by IBM of any 'appropriate market.' "

Since the plaintiff offered no testimony "even attempting to calculate such damages" and the jury would therefore have to speculate on the amount of damages supposedly sustained, IBM also asked whether the court of appeals erred in holding that Greyhound had offered sufficient evidence of damages to put the case before a jury.

"The judgment appealed from, in total effect, condemns competition. If allowed to stand, it would make the Sherman Act a restraint of trade," the IBM brief contended.

Bubbles Won't Mature Until '80, CSI Predicts

SAN JOSE, Calif. — The bubble memory will not be a viable competitor to semiconductor memory until 1980, according to a study by Creative Strategies, Inc. (CSI) here.

Although bubble technology is "glamorous," CSI said such memories will not be commercial realities until their density increases by a factor of 10. That is expected in the 1980 time frame.

After the introduction of a 1M-bit bubble memory chip, however, the market expansion should be rapid, the firm predicted in a report on "Semiconductor and Bubble Memories," available for $595.

At the same time, the report noted the semiconductor memory market is growing rapidly, largely at the expense of core memories.

"The ferrite core memory is being phased out in all computer designs, so by 1980 very little core memory will be in production," CSI predicted.

Semiconductor memory had a shipment rate of 100 million units in 1976 and "will easily" exceed 200 million units by 1981, CSI said, when the total number of semiconductor memory bits will exceed one trillion.

The overall market for semiconductor and bubble memory will grow at an annual rate of 25% over the next several years, from $471.6 million in 1976 to $1.42 billion by 1981, the report forecast.

CCDs Too Costly

Along with bubble memories, charge-coupled device (CCD) memory will also become available in a large enough size to be attractive by 1980, the report said.

"However," it added, "the CCD devices will not become inexpensive enough to capture a large market."

Caught between large dynamic NMOS arrays and bubble memories, CCDs will be squeezed into a small market niche, capturing only 2% of total memory sales by 1981, according to CSI.

The NMOS dynamic random-access memory (RAM) will continue to account for the largest share of this market, the report said, with a compound growth rate of 27% through 1981, when this technology will account for $422 million in shipments.

MOS static RAM shipments will increase at a rate of 37% annually, growing along with the microcomputer market, the report said.

Appeals Court Strikes Down AT&T Plea in Milgo Case

DENVER — In the latest action in the patent infringement suit filed by Milgo Electronic Corp. (now Racal Milgo, Inc.) against AT&T, one of its subsidiaries and a Bell System operating company, an appeals court has dismissed a plea by AT&T asking for reversal of two orders handed down by the Federal District Court in Kansas.

The first order dismissed by the Federal Appeals Court of the 10th Circuit was a discovery order that allowed a Milgo expert access to certain AT&T technical documents.

The second was a request to have the case moved from Kansas to the U.S. District Court for the Southern District of New York.

Milgo filed the suit in early 1976 against AT&T, Western Electric Co., Inc., Southwestern Bell Telephone Co. and Boeing Computer Services, Inc., a user of AT&T modems in Wichita.

Milgo alleges the Dataphone 208 and 209, modems made by Western Electric, infringe on four of Milgo's patents.

One patent allegedly being infringed involves the narrow band concept of transmission which allows modems to transmit data at high speeds over voice-quality telephone lines.

The district court in Kansas has not set a trial date for the suit.

Could Store 10 Times More Data

IBM Researchers Testing 1K Bubble Lattice

SAN JOSE, Calif. — IBM researchers here are experimenting with a 1K bubble lattice chip in what IBM claims is the first time the bubble lattice concept has been tested in a fully operational device.

Previous experiments with the lattice concept have indicated it holds promise for storing up to 10 times as much information in a given area as is possible with any other type of magnetic bubble device, according to IBM.

The device and its operating characteristics were discussed in a paper presented by the IBM researchers at the recent Conference on Magnetism and Magnetic Materials in Minneapolis.

Like other approaches to magnetic bubble technology, the bubble lattice stores information in the form of magnetic bubbles, which are tiny cylinders of reverse magnetism formed in a thin layer of a magnetic material such as crystalline garnet.

Microcircuit patterns deposited on the surfaces of these films provide pathways along which the bubbles can be moved under control of an applied magnetic field or electric current.

The bubble lattice device has a capacity of 1K information-bearing bubbles in its storage area, Each one of these bubbles represents a single bit of information. They are arranged — like cylinders in the cells of a honeycomb — in a hexagonal array consisting of 32 rows and 32 columns.

5 Micron Diameter

The bubbles have a diameter of 5 microns and in the array their center-to-center distance is 11.5 microns. This gives a storage density of over 5 million bits per square inch.

In other types of magnetic bubble devices, information is represented by the presence or absence of bubbles at particular locations in the device.

In such devices, the bubbles must be kept four to five bubble diameters apart in order to prevent them from interfering with each other.

In bubble lattice devices, however, the bubbles can be packed much more closely together, giving an inherently higher storage density for the same size bubble, IBM said.

Since every location in the lattice must always contain a bubble, however, information cannot be recorded or sensed as the presence or absence of a bubble. Instead, it is represented by differences in the magnetic structure of the thin, tubular "domain wall" that surrounds each bubble.

This structure can be forced into either of two magnetic states to represent "ones" and "zeros."

Shifting Array

To read information out of a lattice, the entire array is shifted left or right until the column containing the desired information becomes aligned with an "access channel" pair of narrow conductor lines deposited on the surface of the device.

The bubbles in that column are then shifted out of the lattice one by one until the desired information is reached. Whenever a bubble is shifted out of the lattice, another one, with the same information content, must be entered at the rear of the column to prevent the lattice from collapsing.

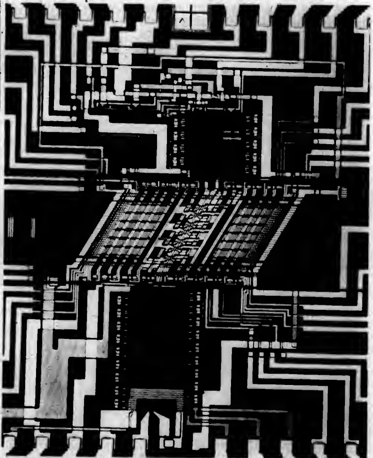
The information stored in a particular bubble is detected by noting whether it moves forward along the line of the column when it is removed from the lattice (a "zero") or at a 30° angle from the line of the column (a "one").

Three Sectors

The experimental bubble lattice chip is divided into separate areas for performing the three main functions of a storage operation. These are:

- The storage area itself, in which the bubbles are organized into a hexagonal array and the array is shifted to an access channel. The array has the form of a parallelogram about 1/64-inch long.
- The write station, in which isolated bubbles are generated and binary information is inserted by controlling the structures of the bubble walls.
- The read station, in which the wall states of isolated bubbles are determined and the bubbles destroyed after their information content is read.

The magnetic material used to fabricate the device is a thin film of crystalline yttrium iron garnet 3.6 microns thick. Besides having desirable magnetic properties, this material is electrically insulating, IBM said.



The 1K bubble storage area appears as a parallelogram in the center of this picture of IBM's experimental bubble lattice device.

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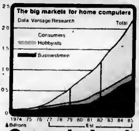

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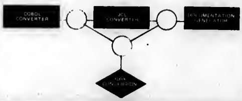

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Data Base Business Seen at $1.1 Billion by 1980

NEW YORK — Spurred by the business sector, data base-generated revenues should climb from $740 million in 1976 to $1.1 billion by 1980 and $1.6 billion by 1985, according to a study from Frost & Sullivan, Inc. (F&S) here.

The sale of information contained in electronic data bases faces a future with almost "no limits," the report added.

Companies in the field already maintain business, technical, economic, legal, medical and other information in data bases, F&S noted. The final product is delivered in the form of a computer printout or computer tape or via a CRT display, the firm added.

The fastest growing segment of the data base market is that for business information, F&S said, predicting a 25% annual growth rate in this sector through 1980.

This area of growth will be followed by economic and econometric data at 20%, legal research at 20% and securities data, scientific data, business credit and specialized marketing information all at an expected 10% growth rate, F&S said.

Publishers, banks, research organizations, time-sharing companies and specialist firms are among the many newcomers to the business, the report said. The industry's customer list, now limited mainly to big corporations, government agencies and technology-oriented nonprofit organizations, is expanding to include medium-size and small companies, it added.

Such market expansion is the result of declining costs, according to the market research company. A complex data base search on a computer costs $15 today, compared 10 years ago with $1,000, F&S claimed.

That cost erosion will continue as optical scanners and word processing systems create machine-readable tapes automatically. Also, coding and indexing systems are continously being approved to simplify search procedures, and eventually standardized retrieval systems will evolve, the report predicted.

Technology advances will also enable vendors to add more value to their services. As computer memory costs decline, vendors will store bibliographic material in full text form rather than as just abstracts, as they now do.

Declining memory costs will also give rise to data bases that cover engineering drawings and other graphic materials, according to the report.

The industry can be classified according to two operational modes, F&S said. An on-line segment connects customers to a data base via a terminal and the telephone network. This sector, "though adolescent, is fast growing" and populated with new companies, the study pointed out.

As an added new business twist, such on-line vendors rely on so-called "value-added" carriers, such as Tymnet and Telenet, to transmit information to and from customers at low cost.

The other, traditional batch mode end of the business that makes heavy use of the mails to initiate and respond to queries is "large and mature." This sector is dominated by big old-line companies, like Dun & Bradstreet and A.C. Nielsen, F&S said.

An industry trend under way, however, is to computerize these data bases and put them on-line as well, the company noted.

Expansions

National Data Corp. has consolidated its Reno, Nev., operations into its Atlanta Communications Center, Corporate Sq., Atlanta Ga. 30329.

Imlac Corp. has established Imlac House, a fully staffed facility in Amersham, England, to provide sales and service of all Imlac products sold in Europe and the UK.

Pertec Computer Corp.'s Microsystems Division (MSD) has transferred its Altair Users Group Software Library and its Altair Software Distribution Co. from Atlanta to divisional headquarters at 21111 Erwin St., Woodland Hills, Calif. 91367.

Azurdata, Inc. has shifted its manufacturing operations to its new 30,000 sq-ft facility in Richland Skypark, Wash. A duplicate 30,000 sq-ft addition is scheduled for construction in 1978.

Qume Corp. has begun construction of a $10 million manufacturing plant and headquarters facility in San Jose's International Business Park.

Centronics Data Computer Corp. has established a subsidiary in Italy, with headquarters in Milan. It is located at Via Santa Valeria 5, 20123 Milan, Italy.

Data Card Corp. has begun building a 112,000 sq-ft facility to house its international headquarters in Minnetonka, Minn.

The Kennedy Co. has leased a 35,000 sq-ft facility in Altadena, Calif., to house its machine shop, sheet metal fabrication and circuit board manufacturing and replace its Glendale facility.

Business Systems Products, Inc. has leased 1,904 sq ft of office space in the Carson Plaza Drive, Carson, Calif. The company will use the three suites to demonstrate and sell its Advisor line.

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Report Paints Profit Picture in DDP/Mini Mart

WALTHAM, Mass. — In the minicomputer/distributed data processing marketplace, suppliers depending primarily on third-party channels — distributors and OEMs — to market their products are generally more profitable than those who market directly to end users.

That's one of the conclusions in a recent report in the *Distributed Processing Newsletter*, published by International Data Corp., an industry research firm here.

In addition, the newsletter said that as a group, companies with more than $50 million in revenue showed a slightly higher profit margin than companies with lower revenues and that those in the $50 million to $200 million range fared best.

Furthermore, the fastest growing companies have experienced the highest profit margins over the past five years, the newsletter said, adding that companies which have concentrated on only one of the product areas in the mini/DDP field have experienced slightly higher profit margins than those with multiple product lines.

The most profitable firms in the study were IBM, Intel and Data General, the newsletter said, with margins of 28%, 23% and 23% respectively. Overall, the weighted average for the 35 companies studied was 19%, but if IBM were taken out of the study the overall average would be 9.5%, it added.

The minicomputer makers also outranked all others on the amount spent for research and development as a percent of their gross revenues, the report said, and in the ratio of assets to liabilities.

By category, the weighted profit margins stacked up this way: General-purpose computer makers 21.3% (8.2% without IBM), minicomputer makers 14.6%, small business computer makers 13.8%, component and microprocessor makers 10.7%, and processing terminal [data entry] makers 8.0%. The leaders in each of their respective categories were IBM, DG, Mini-Computer Systems, Intel and Incoterm.

Orders & Installations

Pennsylvania's Department of Revenue has signed a contract with A.B. Dick/Scott for 13 System 200 microfiche processors.

The Chicago Board Option Exchange has ordered Data General Eclipse C/330s and Nova 3/12s from Monchik-Weber Associates, Inc. to aid in development of a system to handle orders from the floor.

Citibank of New York has installed the Hiross Denco "Over 32" environmental control system for its Troy, N.Y., DP facility.

Cagle's, Inc. of Atlanta ordered a Univac 90/30 system for inventory control of poultry. The 90/30 replaces an IBM 3/15B.

American Airlines has contracted with Conrac Corp. to supply and install an Intelligent Flight Information Display System in its terminal at San Francisco International Airport.

The Cuyahoga County Public Library in Cleveland has ordered a Honeywell Information Systems Level 62 valued at $117,000.

Medical/Dental Data Concepts, Inc. of Tempe, Ariz., has ordered a Microdata Corp. Reality system from Escom Arizona.

Security Pacific Mortgage Corp. of Denver has ordered a Honeywell Information Systems Model 66/05 system valued at $807,000.

Taiwan Telephone Association has awarded the Alston division of Conrac Corp. a $500,000 contract for its computerized telephone traffic analysis system.

Medidentic, Inc. of Park Ridge, Ill., has ordered two CMC 3 Keyprocessing systems from Pertec Computer Corp.

Fisher-Price of East Aurora, N.Y., has ordered a Univac 1100/21 system valued at about $3 million as a replacement for its 1106.

Oklahoma State Univesity signed a long-term lease agreement with Inforex, Inc. for a System 7000.

The Peninsular Motor Club of Tampa, Fla., has ordered a Honeywell Information Systems Level 62.

The City of Hope National Medical Center in Duarte, Calif., has ordered a Univac 90/30 system.

The Southeastern Kentucky Baptist Hospital has installed a Honeywell Information Systems Level 62 valued at $105,000 to perform patient accounting and administrative functions.

Pentel of America, Ltd., headquartered in Torrance, Calif., has ordered a Univac 90/30 and two 90/25s valued at about $500,000.

AZS Chemicals of Atlanta has ordered a Univac 90/30.

The J.I. Case Company Credit Corp. of Racine, Wis., has ordered an Installment Loan System from University Computing Co. of Dallas.

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To Broaden Media Offerings

EMM to Acquire Group/3 From Informatics

HAWTHORNE, Calif. — Electronic Memories & Magnetics Corp. (EMM) has agreed to acquire Group/3 from Informatics, Inc.

The move is an extension of the firm's commitment to the media business and enables EMM to supply a broader range of media products, a spokesman said.

Group/3 sales and marketing will be moved here to EMM's facility while manufacturing and distribution will be handled in San Jose, where EMM's Media Products Division is based.

In fulfilling its growth requirements, EMM has emphasized guaranteed satisfaction to its media customers, the spokesman added.

By letting customer needs be its guide, the firm has expanded into the flexible diskette market from disk packs and cartridges.

Thus users are able to "fill their data storage and retrieval media needs from one source," according to Roger Evans, general manager of the Media Products Division.

EMM's involvement in the media business began in 1969 when it acquired Caelus Memories, Inc., a maker of disks. The Caelus line now includes over 150 versions of disks and diskettes.

In 1976, the firm sold part of its media operation to Univac, which enables it to purchase coated disks to its specifications from a variety of sources "at a cost less than we could coat the disk ourselves," Evans said.

Profitable Step

This action substantially improved EMM profit and cash generation. "The division has the manufacturing capability necessary to support its commitment to the media business. The future will be approached on a controlled basis with continuing emphasis on product quality and customer service," Evans said.

"We plan for a full line of media products and computer supplies. Our intent is to stay very close to the computer room and those supplies required to support computer operations," he added.

EMM's emphasis will be to serve and expand its media customer base, develop media business within the memory customer base and pursue new accounts.

Areas of Expansion

Heaviest revenue impact in 1977 comes from IBM compatible products predominantly in the 3330 Model I and Model II areas. According to Evans, "areas in which we are expanding include non-IBM compatible disk packs and cartridges, flexible diskettes and customer service including cleaning, verification and refurbishing of media regardless of original manufacturer or type."

EMM provides both sales and lease in addition to a refurbishment service. Again, EMM has stood by the old cliche of "what's good for our customers is good for us." Leasing has turned out to be extremely profitable for the company and the company has developed a strong lease base in media as well as 360/370 add-on memories.

"Since we had the resources to cater to our customers' needs, it was quite easy to offer various financial plans — sale or lease," Evans said.

Customer-owned packs can be returned to the San Jose facility for refurbishment — about 15% of the business. This combination provides for a balanced operation.

Intel Splits Micro Division

SANTA CLARA, Calif. — Intel Corp. said it has split its microcomputer division into a components division and a systems division in an effort to better align marketing design and manufacturing operations to serve customers more efficiently.

The microcomputer components division, which includes processors and peripherals, is headed by Les Zadasz, formerly assistant general manager of the microcomputer division.

Systems Division

The microcomputer systems division will be under Dr. Bill Davidow, who was head of the single division, and will include all systems and board-level microcomputer products.

Furthermore, the firm has designated a new components group, under E.L. Gelbach, that includes two product-oriented divisions with responsibility for product marketing, design and operations.

The memory components division will be responsible for all dynamic and high-speed static (random-access memories (RAMs) while the special products division will handle static RAMs, read-only memories (ROMs), and erasable programmable ROMs and bipolar memory products.

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Ream Hits Cost of Proposed I/O Fips Revision

By Molly Upton
CW Staff

SAN CLEMENTE, Calif. — Operational overhead and additional cost will result from the revised implementation segment of the proposed I/O channel-level interface standard, according to Norman Ream, former head of the National Bureau of Standards' (NBS) Institute for Computer Sciences & Technology.

Under the revision proposed by NBS for the draft Federal Information Processing Standard (Fips), federal systems would be allowed to have more than one type of I/O channel-level interface, he explained.

In a letter to Jordan J. Baruch, assistant secretary for science and technology in the Department of Commerce, Ream provided the specifics missing from an earlier letter to Secretary of Commerce Juanita Kreps. That letter said the proposed standard "makes a mockery of the Federal DP standards program" and is "unenforceable" [CW, Sept. 12].

Cost Benefits

Ream pointed out that the standard contains no requirement that government agencies measure the cost benefits of a system configured both with and without the standard.

Furthermore, the proposed Fips contains no reference to overall systems life. "How do you propose to benchmark the system as required ...?"

Numerous problems could arise under the section that requires a system to support a minimum of one standard interface, but which also allows a maximum of four, Ream contended.

"There does not appear to be any logical reason for allowing more than one type of I/O channel interface on a system," he observed. "The operational problems created by such a 'mixture' are not comprehensible, nor is the 'maximum of four' an understandable constraint.

"The use of mixed channels on a system will require major changes in the operating system, will severely increase the [operating system's] overhead cost and will severely handicap the system throughput," according to Ream, now based in San Clemente.

For example, the system will need complete software support for each type of channel, thus more overhead and a larger operating system.

There would also be separate access methods for the different types of devices on these different channels, and different protocols for different channels affects the program status word and channel address word, he said.

Error Recovery

In addition, the system would need separate error recovery logic, he pointed out.

Nowhere does the implementation section of the proposed Fips mention who will bear the cost of software modification or who will furnish the increased operations software requirements, Ream noted.

The provision that the government can initially acquire a system without any interfaces conforming to the standard "is an 'open road' to avoidance of the standard and will be used as such," Ream remarked.

If such a provision is to exist, it should minimally require the manufacturer to demonstrate the capability to meet it and furnish all software requirements to continue the operability of the CPU, he stated.

The provision should require "that the associated costs and also the capability of the system when the standard is employed be part of the total evaluation process." Currently the proposed implementation only refers to "the cost," he added.

Further, the provision should require the comparison of cost for peripherals furnished both by the system maker and by outside sources, he stated.

Ream deplored the section that grants agency heads the authority to waive the requirements. "Once again the Department of Commerce and NBS are shirking their responsibilities," he charged. "Congress has made very clear its opinion that waiver of a Fips should be granted only by NBS and should not left to the discretion of an agency head."

He recommended redrafting the implementation portion of the document and also providing for two phases of implementation.

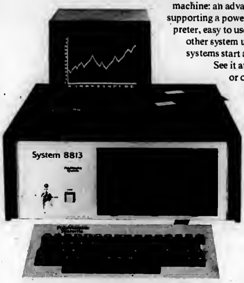
The first phase would require suppliers of CPUs to the government to furnish the standard channel-level interface for those CPUs announced and demonstrated as of the effective date of the standard.

The second phase would involve requiring suppliers to do the same on CPUs not announced and not demonstrable on that date.

Should the Commerce Department decide not to adopt those suggestions, Ream asked that it publish at the end of the first year of implementation the number of applicable CPUs that have adopted the waiver procedure and the number that have actually employed the standard.

Cbema Elects Chairman

WASHINGTON, D.C. — The Computer and Business Equipment Manufacturers Association (Cbema) has elected Roy L. Phelan, vice-president for research and development at NCR, to be the 1977-1978 Cbema chairman of the board.



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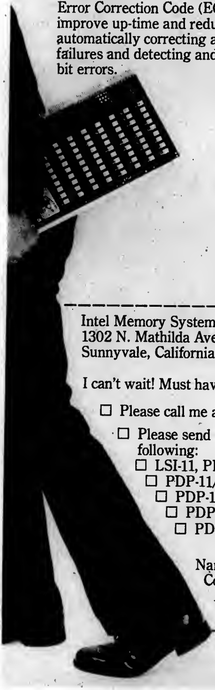

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Earnings Reports

ELECTRONIC ARRAYS
Three Months Ended Sept. 30

	1977	1976
Revenue	$3,391,000	$3,561,000
Loss	754,000	1,487,000
9 Mo Rev	9,800,000	9,600,000
Loss	1,863,000	1,342,000

ELECTRONIC ASSOCIATES
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.06	.....
Revenue	6,764,000	$6,154,000
Tax Cred	16,000	12,000
Earnings	169,000	(780,000)
9 Mo Rev	17,858,000	17,806,000
Tax Cred	102,000	276,000
Disc Op	.....	644,000
Loss	980,000	1,132,000

ELECTRONIC DATA SYSTEMS
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.34	$.26
Revenue	49,226,000	36,706,000
Earnings	4,282,000	3,297,000

HEWLETT-PACKARD
Year Ended Oct. 31

	1977	1976
	(000)	(000)
Shr Ernd	$4.27	$3.24
Revenue	1,360,100	1,111,800
Earnings	121,600	90,800
3 Mo Shr	1.14	1.19
Revenue	379,200	319,700
Earnings	32,800	33,400

HONEYWELL
Three Months Ended Sept. 30

	1977	1976
	(000)	(000)
Shr Ernd	$1.70	$1.80
Revenue	711,592	e636,464
Tax Cred	2,304	1,384
Earnings	35,984	b36,959
9 Mo Shr	4.58	3.43
Revenue	2,080,639	e1,784,093
Tax Cred	8,718	4,820
Earnings	96,479	b69,889

e-Restated. b-Includes capital gain of about $12 million from sale of part of Honeywell's interest in Honeywell Bull.

INFOREX
Three Months Ended Sept. 30

	1977	e1976
Shr Ernd	$.29	$.24
Revenue	19,734,000	19,601,000
Tax Cred	140,000	60,000
Earnings	841,000	708,000
9 Mo Shr	.60	.53
Revenue	46,754,000	45,884,000
Tax Cred	296,000	261,000
Earnings	1,781,000	1,560,000

e-Restated.

INFORMATION INTERNATIONAL
Three Months Ended Oct. 31

	1977	1976
Shr Ernd	$.15	$.17
Revenue	3,403,345	3,732,981
Earnings	423,404	457,570
6 Mo Shr	.23	.38
Revenue	6,897,228	7,663,109
Earnings	606,975	1,205,883

INTEL
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.73	$.63
Revenue	a73,349,000	61,879,000
Earnings	7,748,000	6,761,000
9 Mo Shr	2.17	1.82
Revenue	a209,267,000	157,867,000
Earnings	23,034,000	17,258,000

a-Includes $1.6 million proceeds from sale of EG&G common stock.

IBM
Three Months Ended Sept. 30

	1977	1976
	(000)	(000)
Shr Ernd	$4.68	$3.90
Revenue	4,585,698	3,957,292
Earnings	690,362	586,901
9 Mo Shr	12.92	11.47
Revenue	13,096,063	11,786,924
Earnings	1,922,035	1,724,095

ITEL
Three Months Ended Sept. 30

	1977	e1976
Shr Ernd	$.75	$.46
Revenue	88,300,000	61,700,000
Earnings	8,400,000	4,000,000
9 Mo Shr	1.82	1.21
Revenue	262,300,000	183,400,000
Spec Cred	b800,000	.....
Earnings	19,700,000	10,200,000

e-Restated to reflect acquisition on a pooling-of-interests basis. b-Consists of $1.9 million gain from accounting change, less $1.1 million loss from redemption of debentures.

ANACOMP
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.22	a$.21
Revenue	6,177,345	2,929,466
Earnings	283,811	232,859

a-Adjusted for 10% stock dividend paid in September 1977.

KEANE ASSOCIATES
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.14	$.11
Revenue	1,974,000	1,392,000
Earnings	116,000	90,000
9 Mo Shr	.38	.28
Revenue	5,329,000	4,066,000
Earnings	308,000	243,000

ALANTHUS
Year Ended Aug. 31

	1977	e1976
Shr Ernd	$.93	$.48
Revenue	37,978,000	29,129,000
Earnings	1,641,000	746,000

e-Restated.

CALIFORNIA COMPUTER PRODUCTS
Three Months Ended Oct. 2

	1977	1976
Shr Ernd	.....	$.09
Revenue	$26,373,000	30,513,000
Earnings	(587,000)	287,000

APPLIED DATA RESEARCH
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.30	$.31
Revenue	5,126,661	3,934,077
Tax Cred	...	21,000
Earnings	412,891	381,150
9 Mo Shr	.85	.93
Revenue	14,761,955	11,166,874
Tax Cred	...	364,000
Earnings	1,167,179	1,136,919

BRADFORD NATIONAL
Three Months Ended Sept. 30

	1977	1976
Shr Ernd	$.23	$.10
Revenue	23,988,000	16,478,000
Tax Cred	16,000	.....
Earnings	963,000	398,000
9 Mo Shr	.87	.61
Revenue	66,494,000	46,788,000
Tax Cred	168,000	.....
Earnings	2,730,000	2,483,000

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95	Other ______________

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12	VP/Assistant VP
13	Treasurer/Controller/Finance Officer
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22	Director/Manager/Supervisor DP
23	Systems Manager/Systems Analyst
31	Manager/Supervisor Programming
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42	Other Engineering
51	Mfg Sales Representative
52	Other Sales/Marketing
60	Consultant
70	Lawyer/Accountant
80	Librarian/Educator/Student
90	Other ______________

Eger: Competitive AT&T Vital to Technology

CHICAGO — Free and responsible competition from such corporate giants. as AT&T is essential to furthering U.S. technology in the computer/information industry, a former White House telecommunications policy-maker told the City Club of Chicago recently.

AT&T's future "lies in the marriage of AT&T's existing network with the symbol of this information age in which we live — the computer," according to John Eger, who headed the White House Office of Telecommunications Policy for two years during the Ford Administration.

"That is where AT&T ought to be focusing its resources — both financial and intellectual," Eger said.

"AT&T must stay ahead. It must develop the most efficient and effective means of meeting the demands of the marketplace. It's got the technology; it must continue to enrich it.

"If that takes doubling or tripling capital investment, then AT&T should make that expenditure. And if it asks where the money is to be found, I direct it to the North American Telephone Association's 1976 submission to the Federal Communications Commission."

That document "concluded that, by accepting an end to its monopoly of the terminal equipment industry — by competing freely in the interconnect industry — AT&T can rid itself of a part of its business that fails to produce a proportionate share of profit and eats up potential reserves," Eger said.

"It is more important to the information society which AT&T serves for AT&T to do extremely well in research and development in the information industry, without monopoly protection, in open, uninhibited competition with others in the field so that the consuming public and the U.S. economy benefit from innovation stimulated by innovation," he contended.

"It is more important that America's technological lead in the information industry be preserved. That is worth doing, and AT&T is capable of doing it well," Eger concluded.

Games Growing 18% by '82

MENLO PARK, Calif. — Total U.S. production of games and amusements, both electromechanical and electronic types, will exhibit an average annual growth rate of 18% during the 1976-1982 period, according to a recent study by Gnostic Concepts, Inc.

Electronic games and amusements accounted for 65% of the total production of games and amusements at the start of this time interval; by 1982 this sector of the overall market will approach 94% of the total, according to Gnostics' estimate.

Programmable home game units will become increasingly important during the 1976-1982 timeframe, the report said, noting the microprocessor-controlled game unit for educational or other nongame uses, including programmed financial aids, is the next step toward a home computer.

Gnostic Concepts is located at 2710 San Hill Road, Menlo Park, Calif. 94025.

Foreign Orders & Installations

The Supreme Court of Japan has ordered a Univac 90/30 system to prepare annual judicial statistical reports.

The National Bank of Poland has installed an NCR Century 251 system to process savings accounts.

Taiwan Telecommunications and Telephone Administration has ordered seven Hewlett-Packard Co. 1000 series computers and peripherals worth more than $850,000 to modernize the present manual method of finding customer phone numbers. The specially designed CRT terminals have keyboards which accept a Chinese phonetic code.

Tokyo Electric Power Co. has ordered eight Univac 90/80 computer systems from Nippon Kaisha Ltd., the Univac marketing organization in Japan.

The Simulation and Electronics Division of LMT has purchased a SEL 32/55 computer system from Systems Enginering Laboratories SA, Paris, for use in the training via simulation of Eastern Airlines crews to fly the A300 Airbus.

Systemshare Ltd. of Edinburgh, Scotland, has installed a Honeywell 66/07 computer valued at more than $1.2 million.

Superior Office Supplies in Montreal has installed a Mobus Industries 18-terminal Digital Equipment Corp. PDP-11/70.

The province of Alberta, Canada, has awarded two contracts for traffic control systems valued at almost $1 million to Honeywell Corp.

Ackermann in Entlebuch, Switzerland, a large fashion mail order house, has ordered a Univac 90/60 system.

Savacentre Ltd. has ordered 38 NCR 255 terminals, an NCR I-8200 and an NCR 726 minicomputer for the firm's hypermarket at Washington in County Durham, UK.

The UK's National Westminster Bank has ordered proof and encoding equipment valued at over $5 million from NCR Corp.

Armstrong Equipment Ltd. of Melton, Great Britain, a motor industry group, has ordered a Honeywell Model 66/05 computer valued at $1 million.

Matthews Group Ltd. of London, Ont., a construction and land development company, has installed a Honeywell Level 62 system valued at $183,800.

The European Space Agency has awarded contracts to Computer Technology Ltd. to supply a number of Model 8050 sytems with Camac interfaces for use in ground checkout stations for forthcoming satellite launches.

The Swiss Credit Bank in Zurich has ordered from Bunker Ramo GmbH its Bank Control System 90 terminals for more than 120 of the bank's branches in Switzerland. The total project is valued at over $5 million.

The Computer Communications Group of the Trans-Canada Telephone System has selected NCR Canada Ltd. to supply network interface machines for the Datapac network. The value of the contract exceeds $1 million.

Hanwa Co. Ltd., a Japanese steel distributor based in Osaka, has ordered a Univac 1100/11 system from Nippon Univac Kaisha, Ltd.

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A single firm should supply seven people during 1978 to provide technical support for Project Management, Requirements Analysis, Design, Data Base, and Communications.

Details available from:

Mr. Trond A. Jackobsen, Project Technical Director
Human Services Information Systems Development
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OMB Moves to Reform Contracting Procedures

By Molly Upton
CW Staff

WASHINGTON, D.C. — In another attempt to grapple with the thorny problem of determining when work should be contracted to outside firms and when it should be performed by government agencies, the Office of Management and Budget (OMB) has issued new guidelines.

The new proposal to OMB Circular A-76 states OMB's preference for retaining ongoing work within the government while encouraging new work to be contracted outside.

Acting Director James T. McIntyre Jr. emphasized that the proposal is subject to change and added that OMB received over 100 formal comments in preparing the package.

The circular states the federal agencies may generate a product or service only when this can be justified in the national interest. Grounds include "necessity for military readiness, lack of a suitable commercial source or finding that commercial performance would be costlier or that the function should be performed by government employees."

To justify the conversion of an ongoing in-house activity to outside performance, the cost of using a contractor must be less than the government cost by at least 10% of federal personnel costs," the proposal stated.

"This recognizes a potential loss of production, decrease in efficiency and unpredictable risks that go with such a conversion," OMB stated.

But in order to encourage agencies to contract out new projects, "the government's costs would have to be lower by at least 10% of personnel costs and 25% of material and facility costs to justify starting a new commercial or industrial activity."

This clause also recognizes the "risks of duplication, waste and obsolescence when the government invests in a new plant and facilities," OMB stated.

McIntyre clarified new work as that with no federal workers' jobs at stake.

Furthermore, "all comparative costs studies would use firm competitive bids for determining commercial costs. 'Ivory tower' estimates or informational quotations would be prohibited," the memo continued.

As a guideline for computing government costs of operations, the OMB proposed a formula for overhead of 24.4% of salary of federal employees, down from 28.7%, for the retirement cost factor and insurance costs.

Each agency would have to review its commercial activities every three years.

Other aspects of the proposal include requirements for more detailed criteria in seeking exceptions.

A public disclosure will be required for all documents and calculations performed by the government in order to promote a policy of openness.

A government group is developing a common, government-wide "handbook" of cost guidelines and factors to be used uniformly by all federal agencies. McIntyre stated this effort will move the government in the direction of full costing.

The OMB is also proposing a package of personnel policies which includes a clause that would give government employees rights of first refusal for contract jobs in cases where their activities are converted.

Each agency should have an independent review board that may hear appeals of decisions involving in-house vs. contracting out, the proposal indicated.

AJ and Vadic Cross Licenses

SUNNYVALE, Calif. — Anderson Jacobson, Inc. (AJ), maker of acoustic couplers, and Vadic Corp., maker of modems, have signed a cross-license agreement that observers expect will result in an acoustic coupler version of the Vadic VA3400, which operates on a full-duplex, two-wire line.

Under the agreement, AJ received an exclusive license to market acoustic couplers and a nonexclusive license to offer selected modems compatible with the VA3400.

Vadic was granted a nonexclusive license to market an acoustically coupled version of the VA3400 based on technology to be supplied by AJ.

Supershorts

Computer Communications, Inc. has finalized an increased credit line with Wells Fargo Bank which boosts the credit available from $1.8 million to $3.8 million.

— — —

Agile Corp. has been established as a subsidiary of the Dataflux Corp. to service the Gen-Com Systems, Inc. line of daisy printer terminals. Gen-Com went bankrupt.

— — —

The Data Products Group of Lear Siegler, Inc. has completed an agreement with Control y Proceso Electronico S.A. under which the Mexico City-based firm will produce Lear Siegler CRT terminals.

— — —

Tab Products Co. has increased the number of shares outstanding from 1.2 million to 5 million and approved a 3-for-2 stock split.

Can off-the-rack softwear fit you like a glove?

A special report on *Applications Packages* in the January 30th *Computerworld.*

When the applications program you write yourself costs five times as much as a package you can buy off the shelf, "canned" software has a lot of appeal. Off the shelf software has become more attractive for vendors, too. Many small system manufacturers, for example, have found that applications software sales can add 15% or 25% to their hardware revenues. And more companies than ever before are entering the market with new software products for a wider range of applications — with ever greater modularity.

We'll be taking a close look at the subject in our January 30th special report, titled *Applications Packages*. Edited by Don Leavitt, this report will summarize the latest information available — including products, vendor strategy and market activity. in problem/solution format, the report will feature user experiences in the evaluation, selection, installation and use of applications packages, as well as topics like these.

- Converting programs and files from one hardware or operating system to another — examining the effort required.
- A statistical evaluation of commercial software — survey.analysis.
- A review of vendor support for training and installation, and for installed packages affected by government regulations.
- Applications options offered to users through remote computing services.
- An overview of the industry — how vendors are expanding into new applications areas; adapting current lines to different CPU's; or consolidating product line to concentrate in selected areas of expertise.

If you're an MIS executive, DP Manager, Supervisor or Lead Programmer, our January 30th special report should be on your reading list. If you market programming products or services, you should put this report on your ad calendar. Ad closing date is January 13. Your *Computerworld* salesman can give you complete details. Or reserve your ad space today with a call to Terry Williams at (617) 965-5800.

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There is no better place to be than in a sunbelt area where you have a choice of positions with highly competitive salary ranges. Positions are available now for Programmer $16-20,000, Programmer Analyst $16-22,000, Analysts $18-24,000 & Project Leaders $20-25,000. IBM 360/370 OS & DOS/VS. IMS exp would be a plus. Forward your resume immediately to Jim Fleming, Robert Half Personnel Agencies, Suite 231W, 4801 Woodway, Houston, Texas 77056.

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Network Analyst	to 35K
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Minicomputer Programmers

Requires experience on 16 bit mini's using Fortran or Assembly languages working on data base management, communications, factory automation, interactive graphics and computer aided design.

Send your resume in confidence to:
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This position requires 2 years experience in a manufacturing environment with special emphasis on mini-computer applications in manufacturing and engineering. We prefer a college degree and knowledge of PDP 11 series (11/60 would be ideal), RSX-11M operating systems, FORTRAN IV and/or DEC BASIC. Responsibilities will be broad-based, including systems analysis, programming, scheduling and general administration and management.

SYSTEMS ANALYST

You must have a minimum of 2 years experience in an IBM environment, preferably in manufacturing areas. Responsibilities will be varied.

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Prefer a minimum of 2 years experience with IBM equipment and a knowledge of COBOL and FORTRAN.

We offer qualified candidates excellent starting salaries and comprehensive company-paid benefits including paid relocation to Iowa. For consideration, please submit your resume, including salary history and current requirements to:

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Manager, Professional Employment
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Our client desperate for MFG ENVIRON exp. Phila firm has key spot for sound 360/370 OS/DOS COBOL exp. IMS, DBOMP or CICS exp reqd. Knlg BAL and/or RPG helpful, not reqd. Excellent prospect for growth into analy and/or mgmt. Depending upon exp. sal range $19,000 to $21,000 (Fee pd).

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SOFTWARE SPECIALISTS
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Banking systems development, previous supervisory experience required.

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SCIENTIFIC
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Personnel
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Suite 100
Tampa, Fl. 33807
(813) 872-1853

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The U of M Department of Biometry seeks Analyst Programmer for Medical Research. Degree preferred. Minimum qualifications: 1 year exp/trng in Statistics and 2 years programming & systems design exp. FTN/SPSS/OBMS exp. helpful.

Salary: Start $15,000/yr. + excellent benefits.

Send resumes or write for application: University of Minnesota Personnel Dept., 2651 University Ave., St. Paul, MN 55114.

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Must know D.P. techniques and procedures, possess ability to speak and write effectively and to prepare clear, complete, concise reports and documentation. May develop methods of applying computer technology to solution of problems, assist users in analyzing programming problems, and perform systems analysis. Required: BA or equivalent with one year experience.

Desirable: Advanced degree, 5 years experience, on-line applications, BASIC, COBOL, FORTRAN, SPSS. Salary: $14-17K. Apply Personnel Office, Cal State Bakersfield, 9001 Stockdale Hwy., Bakersfield, CA 93309. EOE. (805) 833-2266.

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Openings also in Ridgecrest, California.

All openings require a minimum of a Bachelor's degree and U.S. citizenship.

Software Engineers

Application and Assembly language programmers are needed for implementing control, signal processing, and autopilot algorithms.

RF Engineers

Engineers required in all microwave disciplines including antennas, receivers and microwave components.

Field Engineers

Will support evaluation testing of weapon systems and subsystems. Specialized experience in software/hardware design or microwave useful.

Design Engineers

Openings for all disciplines including:

- Mechanical/Structural
- Analog
- Digital

System Engineers

Will provide conceptual design definition for a wide variety of systems and subsystems.

Analysts

System analysts to work with system engineers in trade-off analysis to support system concept and definition.

Computer System Engineer

Requires MS or PhD in EE or CS and 5 years' experience in hardware and software design of real-time computer systems.

Technology Requirements Engineer

Requires MS in EE and 8 years' experience in the use of advanced semiconductor technology in system design.

Send your resume in confidence to: Staffing Manager/P. O. Box 6015, M.S. 222/Dept. C/Dallas, TX 75222.

TEXAS INSTRUMENTS
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TVA 44
YEARS OF PEOPLE IN PARTNERSHIP

ANALYST PROGRAMMERS

The Tennessee Valley Authority at Chattanooga, Tennessee, is seeking qualified internal consultants, analysts, and programmer analysts with experience and interest in one or more of the following: project leadership; information systems planning; hardware evaluation and acquisition; data base design and administration; all aspects of software support; design, development, and implementation of major and intermediate-sized systems; program development for large computer systems; and formal classroom instruction on ADP-related subjects.

Applicant should have bachelor's degree, plus three to five years' recent experience working in an IBM large-scale systems environment. A demonstrated ability to communicate orally and in writing, as well as a record of accomplishment, are mandatory.

TVA's computing environment now includes two IBM 370/165's, OS/MVT, HASP, TCAM, TSO, DBMS and TP monitor. An effort is now underway to procure state-of-the-art replacement equipment that will serve TVA's needs to the mid-1980's.

Salary range $14,000 to $21,000-depending opon qualifications. Excellent fringe benefits.

TECHNICAL WRITER

The Tennessee Valley Authority's continued growth has created a need for an experienced Technical Writer at Chattanoga, Tennessee, to write, organize, and edit technical and operational ADP information for publication to TVA's computer users. Publications include an ADP Standards Manual, a monthly newsletter, special user guides, impromptu annoucements, and instructional bulletins. The selected applicant will provide instruction on use of TVA's ADP facilities through personal contact, telephone, and publications and will be responsible for the maintenance of TVA's ADP vendor manual inventory and distribution of manuals to users.

Candidate should have a bachelor's degree or its equivalent in training and experience in computer science, mathematics, or a related discipline, plus at least three years of recent progressive experience in the use of ADP systems. Demonstrated ability and interest in assimilation of and preparation for publication of technical data is required.

Salary to $18,000. Excellent fringe benefits.

Send resume in confidence to Employment Branch CW-76, Room 232 MIB.

TVA may consider for appointments only U.S. citizens and others eligible for payments under section 602, Pub. L. 94-363, and section 750, Pub. L. 94-419.

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Excellent opportunity, high visibility, for shirt sleeve manager. DP operations. NCR century or criterion hardware experience, ability to interface with user departments and strong analytical ability preferred.

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An informal work environment in San Francisco's financial district.

Rand Information Systems offers these opportunities and an excellent salary and benefit plan to qualified programmers.

We are looking for bright achievers with at least 2 years' experience in COBOL and other major languages for large scale third generation machines.

Please send your resume and salary history to Personnel, or telephone (800) 227-0894.

Interviews will be held locally for qualified applicants in late December/early January.

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A Division of Brandon Applied Systems, Inc.
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DATA PROCESSING MANAGER

Rapidly growing manufacturer needs aggressive Data Processing Manager/Programmer.

Environment:

System/3, BOMP, 5230 Data Collection, 3741 Communications.

Requirements:

3 years minimum IBM System/3 RPG II experience.

Send resume and salary history requirements to:

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P.O. Box 459-D
Meadville, Pa. 16335

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Rapidly growing state of the art consulting firm seeks exp'd. "pros" who can adapt to different environments, good technical background, good image. Min. 1 year exp. in COBOL, IMS, Systems Design are all assets. Locations in Boston and Chicago. To $20,000 (Fee Paid).

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(617) 423-6440

DIRECTOR OF DATA SERVICES

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Applicants should have:

- Undergraduate degree in computer science or related discipline or equivalent job experience.
- Knowledge of IBM 370 System
- Management or supervisory background

The ideal candidate will have experience working in a hospital environment.

A fully commensurate salary is complemented by excellent benefits. Write in confidence, detailing education, experience and earnings record to the Personnel Director, Medical College of Ohio, C.S. #10008, Toledo, Ohio 43699. An Equal Opportunity Employer.

POSITION AVAILABLE

SOFTWARE SPECIALIST

The National Astronomy and Ionosphere Center has a position open for a software specialist. This position requires experience and competence in maintenance and enhancement of computer operating systems.

A minimum of three years experience is required but an advanced degree in either software engineering or computer science may be substituted for one year of experience.

NAIC is administered by Cornell University for the National Science Foundation.

The salary available is competitive. Generous fringe benefits are offered. Relocation for self and family will be covered (to reasonable limits).

NAIC is an affirmative action and equal opportunity employer.

For further information contact:
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Head, Computer Dept.
NAIC
Box 995
Arecibo, Puerto Rico 00612

FACULTY POSITION

Purdue University
School of Engineering and Technology

An opening in the Computer Technology Department of IUPUI (Indiana University-Purdue University at Indianapolis) is available in mid-August, 1978. Applicant must have a strong background in IBM Assembler, COBOL and commercial systems, with programming experience in either FORTRAN or PL/I. Teaching experience, work experience, and a minimum of a bachelor's degree are required. Rank and salary dependent on qualifications. Closing date for receiving applications, including resume and three letters of reference is February 15, 1978. Contact Professor Paul M. McLear, Chairman Search and Screen Committee, IUPUI, 1201 E. 38th Street, Indianapolis, Indiana 46205. An Affirmative Action /Equal Opportunity Employer

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PROGRAMMERS/ANALYSTS

The Dayton areas largest and most progressive financial institution has openings for experienced Programmers and Systems Analysts.

A bachelors-degree in Computer Science plus a minimum of 2 years NCR NEAT/3 or NCR COBOL experience desired. Experience with CIF, CIRF and/or commercial bank applications preferred.

We offer an excellent salary PLUS an outstanding benefits program. If you qualify, send your resume along with salary history to Personnel Officer.

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And/or Honeywell 6000, Level 66 or equivalent experience using COBOL. We have positions open at these levels:

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- **SENIOR PROGRAMMER**
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Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
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RSVP SERVICES
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If you are interested in a ground-floor career opportunity, then we should talk. Basic Timesharing Inc. is an established, fast-growing manufacturer of business computer systems, based in California. We're looking for an experienced analyst to provide in-depth technical support to our system salesmen in our midwestern sales region. Your principal responsibility, as part of the sales team, will be to analyze customer applications and propose system solutions. You will be based in Chicago, and your position will involve some travel within the midwestern states.

Naturally, you must have the ability to communicate effectively with customers. You must have insight, because each new customer has different needs. Your experience must include at least three years with minicomputer operating systems and interactive BASIC.

If you're the right person for the job, we'll pay you an attractive base salary, plus strong profit-sharing, along with liberal company-paid benefits. Call or write:

Dick Dolsn
Midwestern Regional Sales Manager
Basic Timesharing, Inc.
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Minneapolis, MN 55420
(612) 854-1122

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Application programmers with proficiency in the COBOL language and understanding of IBM 370-158 OS/BS twin operating systems, on-line experience helpful.

Planning Analysts to assist in analysis and feasibility studies. Some knowledge of programming beneficial.

These positions require 2-5 years work experience in the banking environment. Bachelor's degree or equivalent.

Salary commensurate with background and experience. Excellent benefits.

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Miami, Fla. 33136
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• Managers of Standards $35,000

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• Internal Consultants (2) $33,000

Major NY bank seeks EDP Professional with solid project management exp in a 370/OS/VS environment. Excellent interpersonal skills & formal project life cycle exp required. Excellent opportunity to move into top EDP management.

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A number of client firms have very challenging opportunities for individuals with experience evaluating hardware (large scale & mini), software, word processing, etc.

• Management Consultant $29,000

Prestigious midtown NYC management consulting firm has positions open for Senior Analysts with experience designing & implementing IMS application systems. Very visible, excellent opportunity for growth.

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NY financial firm needs Analyst/Programmer with solid OS/VS COBOL experience to function as a Project Leader. College degree plus financial applications desired.

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We are searching only for exceptional EDP people who insist on working in a creative, challenging environment with appropriate remuneration and excellent growth opportunity.

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All inquiries will be acknowledged.
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Harris Data Communications — a leading supplier of distributed data processing systems and services — is one of 16 high-technology divisions that have made parent Harris Corporation a $650-million leader in communications, information systems, government systems, semiconductors and printing equipment. Our comprehensive family of advanced products also encompasses multi-function remote batch terminals and intelligent interactive terminals — giving us the broadest range of data communications products and services in the industry.

The focal point of Harris' long-term commitment to the distributed data processing marketplace is in Dallas — the heart of the growing North Texas Metroplex, where we currently are completing construction of our new $7-million, 240,000-square-foot headquarters facility. Career opportunities in Dallas are aimed at meeting the many challenges facing us as we design new systems, hardware and software to meet our customers' needs . . . today and tomorrow!

Harris is an equal opportunity employer. We offer excellent starting salaries, the stimulation of working in a highly professional environment and a company aiming at excellence in its industry. Our comprehensive benefits include health, life and disability insurance, a stock purchase plan and a tuition assistance program.

Write in confidence, with a complete resume and salary history, to **Tom Bryan, Harris Data Communications Division, 11262 Indian Trail, P.O. Box 44076, Dallas, Texas 75234.**

Software Development

Programmers — B.S. degree in computer science or related field and 4-8 years experience that includes Assembly and other higher level languages. Cost scheduling a plus. Will be responsible for analysis, design and implementation of new or modified software packages, detailed definition of major modules and the key units of code. This will include performance of program code integration and testing of code units and installation of software. Related function will involve manpower and equipment planning to meet project requirements.

Analysts — B.S. or B.A. degree and 2-5 years experience in Assembly language programming on minicomputers preferably in communications. Responsibilities include providing ongoing support for locally developed programs on Harris equipment that spans all functional areas, interacting with customers and designing and developing new programs as required.

Systems Programmers — Degree and 2 plus years Assembly language experience. Knowledge of and experience in developing Operating Systems, Source Data Entry Systems, Inquiry Response Systems, Compilers, and/or SDLC Communications Systems is desirable.

Hardware Development

Design Engineers — Responsibilities will include establishing hardware/firmware tradeoffs during the specification phase of firmware driver controllers, and scheduling and implementing cost effective designs and specifications. Requires B.S.E.E. (M.S.E.E. desired) and 4 years related experience.

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Quality Assurance Engineers — Will be responsible for qualification/acceptance of new products including hardware, software, and documentation. Also will be involved with reliability assessment and ongoing corrective action programs. Requires B.S. or B.A. degree.

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Marketing Representatives (Chicago, Charlotte, Houston, Philadelphia) — 3-5 years successful computer hardware sales experience required. Approximately 2 years selling large mainframe computers with additional sales experience in intelligent terminal systems is desirable. Prefer that candidates live in the areas listed and have a thorough knowledge of the marketplace. Earnings package includes base salary commensurate with experience plus a lucrative commission plan.

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Senior Manufacturing Engineer — B.S./M.S.E.E. with experience designing and troubleshooting digital and analog test equipment. Should be knowledgeable of machine program languages and have programming capability. Will coordinate test engineering activity and maintain existing test equipment.

Field Engineering

Field Engineers (Boston; Houston; Melbourne, FL; Saginaw, MI; Seattle; Tyler, TX; Washington, D.C.) — Minimum of 1 year experience maintaining digital electronic equipment, minicomputers and data communications equipment. Candidates must live in the areas listed.

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Miller Brewing Company

MARKETING SYSTEMS ANALYST

Data Processing Experience

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The ideal candidate will have 2 or more years of industrial data processing experience working with a sales/marketing application. Additionally, familiarity with the IBM-370, Time Sharing, FORTRAN and COBOL would be ideal. A four-year business degree is preferred.

In addition, to an outstanding opportunity for personal and professional growth, we offer a competitive salary and a liberal benefits program to include company paid health and dental insurance, life insurance, vacations and a retirement plan.

Qualified applicants are invited to submit a resume, including salary history to: Kenneth Campbell, Corporate Recruiting, Dept. 1442, Miller Brewing Company, 4000 West State Street, Milwaukee, WI 53208.

Miller

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SCIENTIFIC COMPUTING ANALYSTS

Application Programmers

The Center for Naval Analyses has two openings for its Washington, D.C. computing services group. Its new, powerful computing system with many high-speed, time-sharing terminals provides easy access to current state-of-the-art software and hardware.

These openings are mid-management positions for individuals with excellent communications skills. A Master's Degree in Computer Science, Mathematics or related scientific fields is required, as well as experience in scientific programming and working knowledge of FORTRAN. The ability to work with professional people is needed.

The responsibilities of the selected candidates will include:

- Analysis and Programming for Naval Studies,
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- Conducting of seminars and short courses,
- Installation, maintenance and support of software products,
- Writing of user manuals and program documentation.

CNA, a Federal Contract Research Center, doing operations research and systems analysis for the Navy, offers a stimulating professional environment and a competitive compensation/benefit program.

If you are interested, please submit complete resume and salary requirements, in confidence to P.D. Moke, Department W:

Center for Naval Analyses
1401 Wilson Boulevard, Arlington, VA. 22209
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INFORMATION SYSTEMS

SYSTEMS ANALYSTS PROJECT LEADERS

Openings now exist in Information Systems for experienced analysts. Responsibilities include all phases of project management, systems design and development.

A BS degree and a minimum of 5 years experience in successful implementation of Financial/Manufacturing systems are desirable. Teleprocessing, on-line and data base systems (TOTAL) background are prerequisites. Applications experience should cover Inventory Control, MRP, Manufacturing Accounting and Payroll.

These positions are at NCR-Dayton Engineering and Manufacturing Group in Dayton, Ohio. If you are a self-motivated professional and believe you qualify, please submit your resume and salary requirements to:

NCR

Mrs. J.E. Chorazawitz
Dayton Engineering &
Manufacturing Group
Employment Dept., CW-1212
NCR Corporation
Dayton, Ohio 45479

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Cleveland, OH	(216) 623-1037
Dearborn, MICH	(313) 336-6650
Indianapolis, IND	(317) 257-4261
Jacksonville, FL	(904) 356-8513
Los Angeles, CA	(213) 930-1313
Louisville, KY	(602) 456-4330
Milwaukee, WISC	(414) 273-4430
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At the National Center for Higher Education Management Systems (NCHEMS), this position involves work on a contract and expires December 31, 1978. Responsibilities will include: 1) Assisting in the design, development, and implementation of a large data base of standard education terminology and definitions for all levels of education, and 2) supervising and organizing the activities of computer programmers. The data base and associated software will assist the Education Data Acquisition Council (EDAC) of the National Center for Education Statistics (NCES) in determining if proposed data collection instruments contain redundant data elements and to produce glossaries of standard data terminology and definitions from a machine-readable data base.

QUALIFICATIONS: Bachelor's degree required in computer science or related field. Minimum of 2 years' experience in software development, involving the design, development and implementation of production software including information retrieval. Proficiency in COBOL, familiarity with other languages. Familiarity with NCES' Handbooks preferred. SALARY RANGE: $15,196-$21,274.

For complete description and/or to submit resume (in duplicate), write to: Director of Personnel, NCHEMS; P.O. Drawer P; Boulder, Colorado, 80302.

RESUMES MUST BE RECEIVED PRIOR TO NOON ON THURSDAY, DECEMBER 22, 1977. Ethnic minority, women, and handicapped applicants are encouraged to identify themselves. All applicants are asked to indicate if they are between the ages of 40 and 65, and the source by which they became aware of the opening. A copy of the Affirmative Action Plan is available for review.

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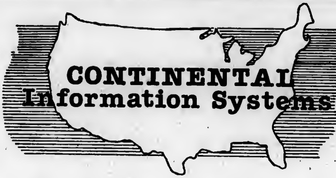

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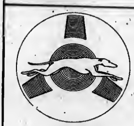

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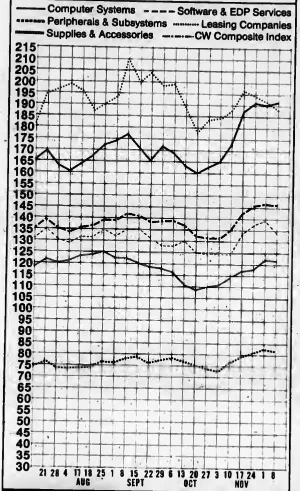

Earnings Reports

ANDERSON JACOBSON
Three Months Ended Sept.30

	1977	1976
Shr Ernd	$.15	$.11
Revenue	7,032,00	5,266,000
Earnings	330,000	262,000
6 Mo Shr	.28	.21
Revenue	13,078,000	6,997,000
Earnings	631,000	496,000

AMPEX
Three Months Ended Oct. 29

	1977	1976
Shr Ernd	$.47	$.26
Revenue	80,606,000	73,636,000
Tax Cred	1,969,000	624,000
Earnings	5,100,000	2,833,000
6 Mo Shr	.86	.43
Revenue	151,372,000	139,285,000
Tax Cred	3,679,000	1,600,000
Earnings	9,622,000	4,645,000

CAMBRIDGE MEMORIES
Year Ended August 31

	1977	1976
Shr Ernd	$2.42	.....
Revenue	7,214,000	$19,412,000
Tax Cred	436,000	.....
Spec Cred	a3,320,000	b(3,377,000)
Earnings	4,230,000	(12,606,000)
3 Mo Shr	.11	.....
Revenue	1,611,000	2,056,000
Tax Cred	96,000	.....
Spec Cred	....	b(3,377,000)
Earnings	208,000	(10,123,000)

a-Gain on extinguishment of certain indebtedness. b-Includes provisions of $1,269,000 for loss on disposition of European subsidiaries, $1,100,000 for loss upon closing a semiconductor operation and $1,008,000 for termination and revision of facility leases.

COMPUGRAPHIC
Year Ended Oct.1

	1977	1976
Shr Ernd	$4.17	$3.65
Revenue	129,845,000	95,270,000
Earnings	9,609,000	7,504,000
3 Mo Shr	1.08	.86
Revenue	34,820,000	24,790,000
Earnings	2,475,000	2,015,000

LEAR SIEGLER
Three Months Ended Sept 30

	a1977	1976
Shr Ernd	$.53	$.37
Revenue	263,062,000	171,474,000
Earnings	6,822,000	6,061,000

a-Includes results of Royal Industries, Inc., acquired in January 1977.

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 7, 1977

All statistics compiled, computed and formatted by
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Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1977 RANGE (1)	CLOSE DEC 7 1977	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	22- 48	45 1/2	+1	+2.2
N	BURROUGHS CORP	55- 91	67 1/2	-1 3/4	-2.5
O	COMPUTER AUTOMATION	18- 30	26 1/8	-1 1/4	-4.5
N	CONTROL DATA CORP	20- 27	25	- 1/2	-1.9
O	CRAY RESEARCH INC	15- 29	26 1/4	- 3/4	-2.7
N	DATA GENERAL CORP	35- 54	47 7/8	-2 3/8	-4.7
N	DATAPOINT CORP	18- 41	39	+1 5/8	+3.6
N	DIGITAL EQUIPMENT	37- 53	44 7/8	-2 1/4	-4.7
N	ELECTRONIC ASSOC.	2- 3	2 3/4	+ 1/4	+10.0
A	ELECTRONIC ENGINEER.	8- 12	12 1/8	+1 1/4	+11.4
O	FOUR-PHASE SYSTEMS	13- 21	19 3/4	+ 1/4	+1.2
N	FOXBORO	41- 54	48 3/8	- 1/8	-0.2
O	GENERAL AUTOMATION	6- 9	8 3/4	- 1/2	-6.8
O	GRI COMPUTER CORP	1- 1	3/4	0	0.0
N	HEWLETT-PACKARD CO	69- 87	71	-1 7/8	-2.5
N	HONEYWELL INC	43- 55	45 1/8	-1 3/4	-3.7
N	IBM	245-286	261	-3	-1.1
O	MANAGEMENT ASSIST	5- 10	9 1/2	+ 5/8	+7.0
O	MICRODATA CORP	7- 18	11 7/8	- 1/8	-3.0
O	MODULAR COMPUTER SYS	5- 9	9 1/4	+ 7/8	+10.4
N	NCR	32- 47	39 5/8	-1 1/8	-2.7
O	PRIME COMPUTER INC	12- 23	21 3/4	- 5/8	-2.7
N	PERKIN-ELMER	17- 22	20 1/4	-1 1/8	-5.2
N	RAYTHEON CO	16- 35	32	-1 5/8	-4.8
N	SPERRY RAND	30- 42	32 7/8	-1 7/8	-5.3
O	SYCOR INC	8- 20	19 3/4	+6 1/8	+44.9
A	SYSTEMS ENG. LABS	5- 11	10 1/4	+ 5/8	+6.4
A	WANG LABS.	10- 14	12 1/2	- 3/8	-2.9

LEASING COMPANIES

EXCH		PRICE 1977 RANGE (1)	CLOSE DEC 7 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALANTHUS CORP	3- 5	4 5/8	+ 1/8	+2.7
O	BOOTHE COURIER CORP	8- 10	12 7/8	+ 3/8	+3.0
O	COMDISCO INC	10- 14	13 1/2	+1	+8.0
A	COMMERCE GROUP CORP	1- 3	5/8	- 1/8	-16.6
A	COMPUTER INVSTRS GRP	1- 2	3/4	0	0.0
M	DATRONIC RENTAL	0- 2	1 1/8	+ 1/8	+12.5
A	DCL INC	1- 3	2 1/4	- 1/8	-5.2
N	DPF INC	6- 10	8 7/8	- 3/8	-4.0
N	ITEL	13- 22	19 1/4	- 3/8	-1.9
N	LEASCO CORP	19- 27	24 1/4	- 1/2	-2.0
O	LEASPAC CORP	1- 2	3/4	- 1/8	-14.2
O	NRG INC	1- 1	1/8	0	0.0
A	PIONEER TEX CORP	5- 11	3 3/8	- 5/8	-6.5
N	U.S. LEASING	10- 16	14 1/2	- 1/4	-1.6

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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SOFTWARE & EDP SERVICES

EXCH		PRICE 1977 RANGE (1)	CLOSE DEC 7 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	0- 2	7/8	0	0.0
O	ANACOMP INC	7- 10	9	0	0.0
A	APPLIED DATA RES.	5- 10	8 1/4	- 1/2	-5.7
N	AUTOMATIC DATA PROC	23- 30	28 3/8	+ 1/8	+0.4
O	COLEMAN AMERICAN COS	2- 2	1 3/4	- 1/8	-6.6
O	COMPU-SERV NETWORK	9- 15	11 1/4	- 3/4	-6.2
O	COMP ELECTION SYSTMS	6- 10	9 1/2	+ 1/2	+5.5
O	COMPUTER HORIZONS	1- 1	1	- 1/4	-20.0
O	COMPUTER NETWORK	6- 11	9 5/8	- 1/4	-2.5
N	COMPUTER SCIENCES	7- 9	8 7/8	+ 1/8	+1.4
O	COMPUTER TASK GROUP	1- 2	1 5/8	- 1/4	-13.3
O	COMPUTER USAGE	1- 3	1 1/2	- 3/4	-33.3
O	COMSHARE	5- 8	7 1/2	- 1/4	-3.2
O	DATA DIMENSIONS INC	3- 5	3 3/4	0	0.0
O	DATATAB	1- 2	1 1/4	- 1/8	-9.0
N	ELECTRONIC DATA SYS.	14- 20	15 5/8	- 5/8	-3.8
O	INSYTE CORP	2- 3	1 1/4	0	0.0
O	IPS COMPUTER MARKET.	1- 2	2 1/4	0	0.0
O	KEANE ASSOCIATES	3- 4	3 7/8	+ 1/8	+3.3
O	KEYDATA CORP	1- 3	1 1/4	- 1/8	-9.0
A	LOGICON	7- 17	14 5/8	+1 3/8	+10.3
A	MANAGEMENT DATA	1- 2	1	0	0.0
A	NATIONAL CSS INC	10- 16	15	- 7/8	-5.5
O	NATIONAL DATA CORP	4- 7	6 7/8	- 1/8	-1.7
A	ON LINE SYSTEMS INC	16- 22	18 3/4	- 1/2	-2.5
N	PLANNING RESEARCH	3- 6	4 3/4	- 1/4	-5.0
O	PROGRAMMING & SYS	1- 1	3/8	0	0.0
O	RAPIDATA INC	2- 3	2 3/4	0	0.0
O	REYNOLDS & REYNOLD	17- 21	19 1/2	- 1/2	-2.5
O	SCIENTIFIC COMPUTERS	1- 4	4	0	0.0
O	TYMSHARE INC	14- 23	21	- 1/4	-1.1
A	URS SYSTEMS	4- 5	4 1/4	- 3/8	-12.8
N	WYLY CORP	1- 2	1	+ 1/8	+14.2

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1977 RANGE (1)	CLOSE DEC 7 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 16	14 3/8	- 5/8	-4.1
O	ADVANCED MEMORY SYS	7- 9	7 3/8	- 5/8	-7.5
N	AMPEX CORP	8- 11	9 1/4	- 1/4	-2.6
O	ANDERSON JACOBSON	3- 5	4 3/8	0	0.0
N	APPLIED DIG DATA SYS	10- 20	13 1/8	- 3/4	-5.4
O	BEEHIVE INT'L	5- 12	5 1/2	- 1/8	-2.2
A	BOLT.BERANEK & NEW	7- 9	7 3/8	- 1/8	-1.6
N	BUNKER-RAMO	8- 13	11 1/2	-1	-8.0
A	CALCOMP	3- 5	2 7/8	- 1/8	-4.1
O	CAMBRIDGE MEMORIES	1- 4	3 3/8	+ 3/8	+14.5
N	CENTRONICS DATA COMP	20- 30	19 3/4	- 3/4	-3.6
O	COGNITRONICS	1- 1	7/8	0	0.0
O	COMPUTER COMMUN.	5- 6	7 1/4	- 1/4	-3.3
O	COMPUTER CONSOLES	4- 7	3 3/4	- 1/4	-6.2
A	COMPUTER EQUIPMENT	2- 5	3	+ 1/8	+4.3
O	COMPUTER TRANSCEIVER	1- 1	7/8	- 1/4	-22.2
O	COMTEN	9- 13	10 7/8	- 1/8	-1.1
N	CONRAC CORP	19- 28	22 1/2	-1 1/2	-6.2
O	DATA ACCESS SYSTEMS	4- 5	3	0	0.0
O	DATA 100	8- 11	10	- 1/2	-4.7
A	DATA PRODUCTS CORP	9- 19	17	- 7/8	-4.8
O	DATA TECHNOLOGY	3- 4	4 1/4	0	0.0
O	DATUM INC	1- 2	1 7/8	- 1/8	-8.2
O	DECISION DATA COMPUT	2- 3	2	+ 1/8	+8.8
O	DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
A	DOCUMATION INC	6- 11	10 1/8	+ 1/8	+1.2
O	DATARAM CORP	2- 24	22	+2	+10.0
N	ELECTRONIC M & M	4- 3	4 1/4	+ 1/8	+3.0
O	FABRI-TEK	1- 2	1	0	0.0
O	GENERAL COMPUTER SYS	0- 2	1 3/4	+ 1/8	+7.6
N	HAZELTINE CORP	8- 12	10 3/4	+ 7/8	+8.8
N	HARRIS CORP	28- 44	41 1/2	+ 3/8	+0.9
A	INCOTERM CORP	10- 19	17 5/8	- 3/4	-4.0
O	INFOREX INC	4- 7	6 3/8	0	0.0
O	INFORMATION INTL INC	9- 14	9	- 1/2	-5.2
O	INTEL CORP	38- 57	44	-1 1/2	-1.2
A	LUNDY ELECTRONICS	3- 6	3 7/8	+ 1/8	+3.3
O	MSI DATA CORP	6- 14	13 5/8	- 1/2	-3.5
O	MEMOREX	23- 34	29 5/8	- 3/8	-2.0
N	MOHAWK DATA SCI	5- 8	6 1/8	+ 1/8	+2.0
O	PENRIL CORP	2- 5	5 5/8	+ 3/8	+7.1
N	PERTEC CORP	7- 11	10 3/8	- 1/8	-1.1
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	2	+ 1/2	+33.3
O	QUANTOR CORP	3- 5	3 1/8	0	0.0
O	RECOGNITION EQUIP	6- 10	7	0	0.0
O	SCAN DATA	1- 2	7/8	- 1/8	-17.6
O	STORAGE TECHNOLOGY	10- 20	18 7/8	-1	-5.0
O	T BAR INC	7- 13	12 3/4	- 1/4	-1.9
O	TALLY CORP.	4- 6	4 1/4	0	0.0
A	TEC INC	7- 10	7	- 1/4	-3.4
N	TEKTRONIX INC	29- 40	38 5/8	- 5/8	-1.6
N	TELEX	2- 3	3	+ 1/4	+9.0
O	WILTEK INC	1- 1	3/4	+ 1/8	+20.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1977 RANGE (1)	CLOSE DEC 7 1977	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 6	6 7/8	+ 1/8	+1.8
O	BALTIMORE BUS FORMS	1- 4	1 3/4	0	0.0
A	BARRY WRIGHT	10- 15	14 1/2	- 1/8	-0.8
O	CYBERMATICS INC	1- 1	7/8	0	0.0
O	DUPLEX PRODUCTS INC	14- 19	16 1/2	- 1/2	-2.6
N	ENNIS BUS. FORMS	6- 7	6 5/8	- 1/8	-1.6
O	GRAPHIC CONTROLS	13- 18	16	+ 1/2	+3.2
N	3M COMPANY	46- 56	46 1/2	-1 7/8	-3.8
O	MOORE CORP LTD	24- 37	27 1/2	+ 1/2	+1.8
N	NASHUA CORP	16- 28	19 1/2	+ 3/4	+4.0
O	STANDARD REGISTER	18- 25	22	- 3/4	-3.2
O	TAB PRODUCTS CO	10- 19	10	0	0.0
N	UARCO	18- 22	20 1/4	+ 1/8	+0.6
A	WABASH MAGNETICS	10- 15	12 3/8	- 5/8	-4.8
N	WALLACE BUS. FORMS	17- 21	20 3/8	+ 1/8	+0.6

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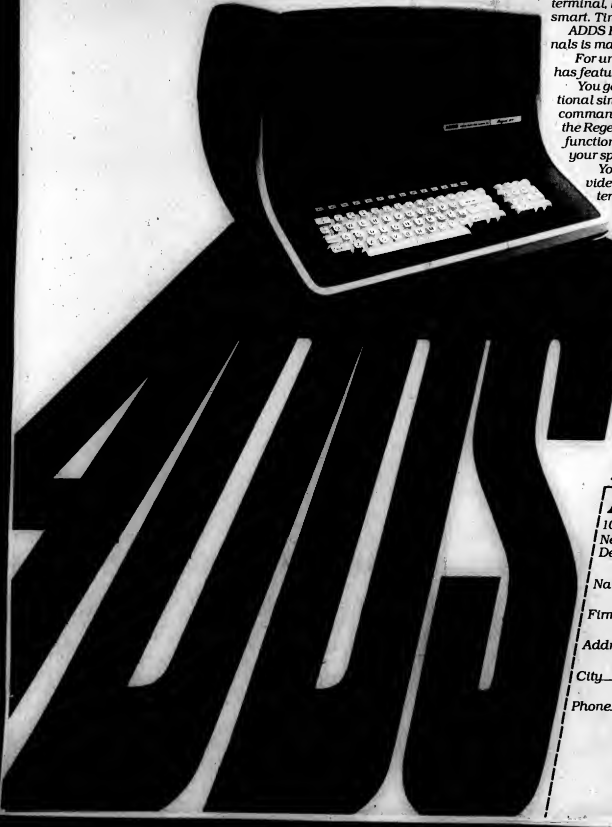

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